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AGRICULTURAL CHEMICALS

A MONTHLY MAGAZINE FOR MANUFACTURERS, PROCESSORS AND DISTRIBUTORS

Serving the field of...

AGRICULTURAL INSECTICIDES

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FUNGICIDES

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STOCK DIPS AND SPRAYS

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SOIL TREATING MATERIALS

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FERTILIZERS

Sept. 1946

Vol. 1 — No. 5

A NEW ERA IN INSECT CONTROL

VELSICOL 1068*

in AGRICULTURAL FORMULATIONS

NON-PHYTOTOXIC

In the extensive experimental work which has been conducted to date in agriculture with effective formulations of VELSICOL 1068 there has been no record of plant injury due to the compound $C_{10}H_6Cl_8$. This indicates that VELSICOL 1068 is safe to use on vegetative crops.

VELSICOL 1068 CONCENTRATE SPRAY OIL SOLUTIONS

For airplane dispersals or concentrate sprayers.
VELSICOL 1068 TECHNICAL is completely soluble in all proportions in all aliphatic and aromatic solvents.

*Patents Pending

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1. Use of VELSICOL 1068 with oil and emulsifier.
Formulation recommended for quick breaking emulsion:
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32½% by vol. Deodorized Kerosene.
5% by vol. of an oil soluble non-alkaline emulsifier.
Each pint of this concentrate contains 1 lb. of VELSICOL 1068 TECHNICAL.
2. Use of VELSICOL 1068 with water and emulsifier.

VELSICOL 1068 INSECTICIDAL DUSTS

Up to 5% by weight on non-absorptive powders such as talc or pyrophyllite.
Up to 50% by weight on absorptive powders such as diatomaceous earth or fossil flour.
Makes excellent uniform dusts with good physical properties.

VELSICOL 1068 WETTABLE POWDERS

These are readily made by the use of 3% of a good wetting agent with a 50-50 mix by weight of VELSICOL 1068 TECHNICAL and an absorptive carrier.

For agricultural work VELSICOL 1068 is available in Technical Grade, 90% purity.
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Manufacturers of: Insect Toxicants · Synthetic Resins · Coresin Core Oils · Aromatic Solvents

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We invite manufacturers to use HUDSON'S experience and ability in recommending the best method and equipment for applying any spraying or dusting material.

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Branches in all Principal Cities in the U. S.

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Makers of Insecticides **Founded 1902**

Minneapolis, Minnesota

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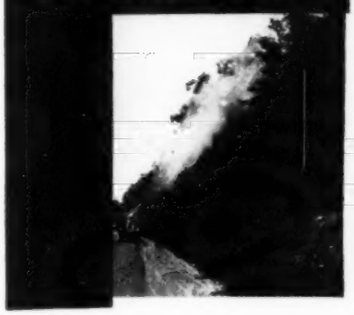
AGRICULTURAL CHEMICALS



THIS MONTH'S COVER

High-velocity blower mounted on a truck distributing DDT as a dust. This equipment is used to distribute either dust or finely atomized DDT sprays. Depth of penetration of the DDT into the forest is high. Note height of telephone pole with relation to column of dust. (Photo by U. S. Dept. of Agriculture.)

SEPTEMBER, 1946
Vol. 1 No. 5

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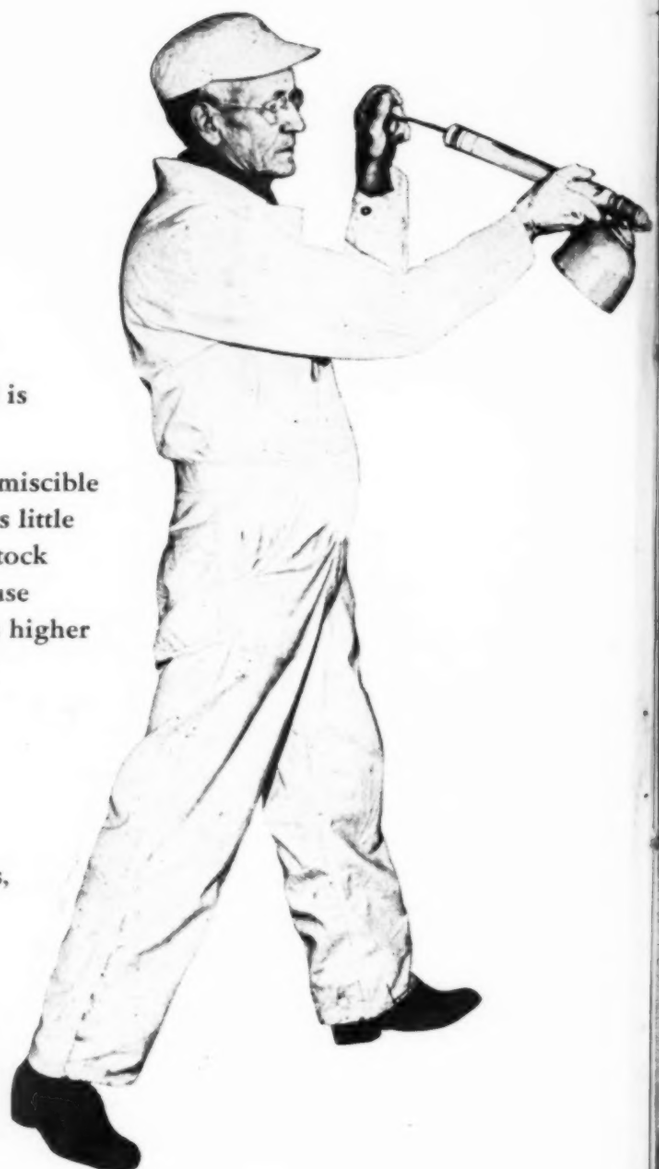

The ideal cattle spray is safe to the animal . . . has quick and lasting knockdown . . . shows high kill . . . gives long-lasting repellency . . . has low residual odor . . . is low in cost . . . and is stable over long storage periods.

Both Thanite (in 50-viscosity oil) and Thanasol 70 (a water-miscible form of Thanite) fully meet these requirements. For example, as little as 4.3 per cent Thanasol 70 (three per cent Thanite) in a livestock spray not only gives quick knockdown of stable, horn, and house flies, but also yields a Peet-Grady kill of 37.5 percentage points higher than the U.S.D.A. Official Test Insecticide (a pyrethrum spray).

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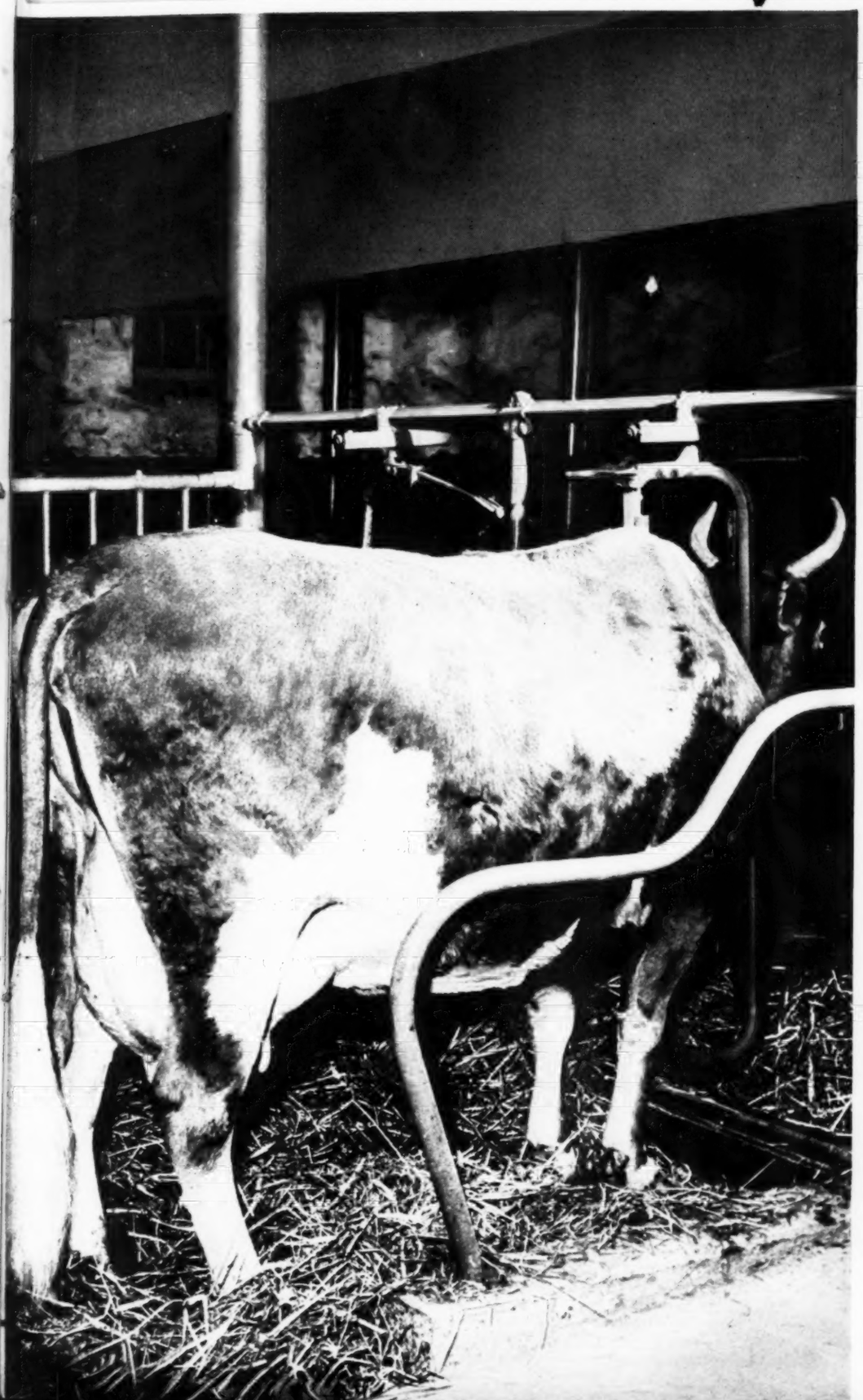

Hercules' new family of toxicants

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THANITE*

Makes a fast-knockdown, high-kill spray effective against household pests such as flies, mosquitoes, bedbugs, silverfish, ants, and moths.

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The addition of DDT to Thanite utilizes the best features of each toxicant. Makes a 100% "Knockdown," 100% "Kill" spray at a very low cost. Such sprays are highly effective—even against cockroaches.

THANASOL 70

A water-base toxicant especially recommended for use in kennels and on livestock. Thorough tests have demonstrated its effectiveness and long-lasting repellency, in both sprays and dips.

THANASOL 70 + DDT CONCENTRATE

Water-dispersible—combines residual effect against horn flies with speedy knockdown and high kill of stable flies. Ideal for making fully-effective livestock sprays.

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WATER-MISCIBLE DDT CONCENTRATE (25%)

Water-dispersible—for use in spraying barns, city dumps, garbage pails, industrial buildings, where the residual effect of DDT is required in the most economical form.

OIL-SOLUBLE DDT CONCENTRATE (25%)

A general-purpose concentrate for use wherever DDT in oil solution is required—such as in storage closets, around baseboards, kitchen sinks, and lamp cords.

Flowability is a mighty important characteristic to both the makers and users of pesticide dusts. It simplifies concentrate compounding . . . adds great value to dilute mixtures . . . paves the way to trouble-free, equipment-saving final applications. To insure free-flowing qualities is one duty of the carrier or diluent, and Attaclay performs this vital job in stride. In the trade, *Attaclay* and *flowability* have become synonymous.

This year, one out of every three pounds of DDT going into dust concentrates is impregnated with Attaclay. Why? Because processors—among the country's largest—find that Attaclay practically eliminates grinding problems peculiar to DDT dusts . . . that 50% Attaclay-DDT mixtures turn out lump-free.

If you work with liquid toxicants, you'll be interested in the fact that Attaclay will adsorb as much as 30%, by weight, of oil containing various poisons, yet flow freely. And, since many new organic poisons tend to be oily, waxy or viscous, such amazing adsorptivity is a factor you need, as never before.

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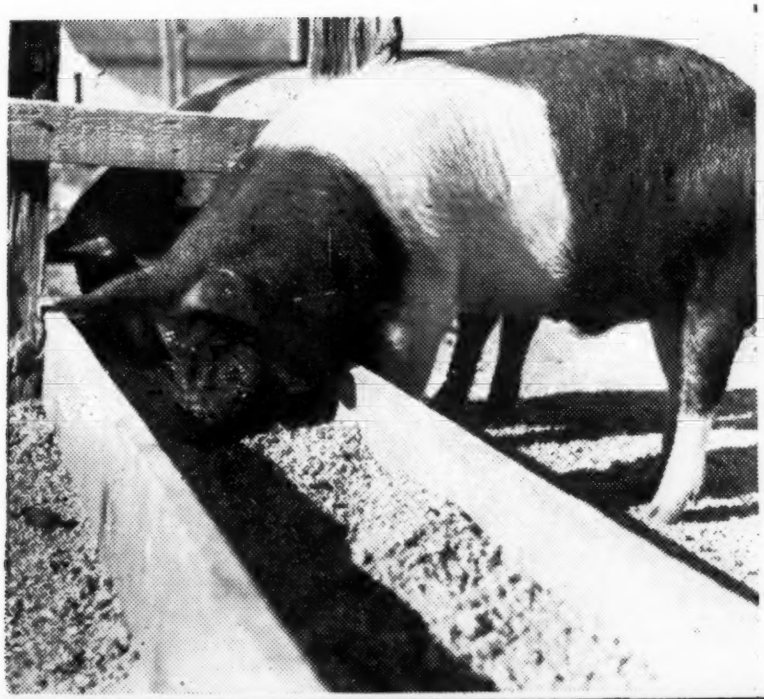

With the scarcity and high cost of feeds, today's farmer is vitally concerned with ways and means of increasing livestock weight and growth.

He knows from experience that one of the surest, most effective ways to keep production up and gain every possible pound of weight from the feed he uses is through diligent insect and pest control as well as other sanitary measures.

Our many years of experience in the formulation of agricultural chemicals plus complete and modern laboratory facilities, enables us to offer a service unsurpassed in this field. Remember... each Baird & McGuire product combines highest quality materials with skilled technical knowledge.

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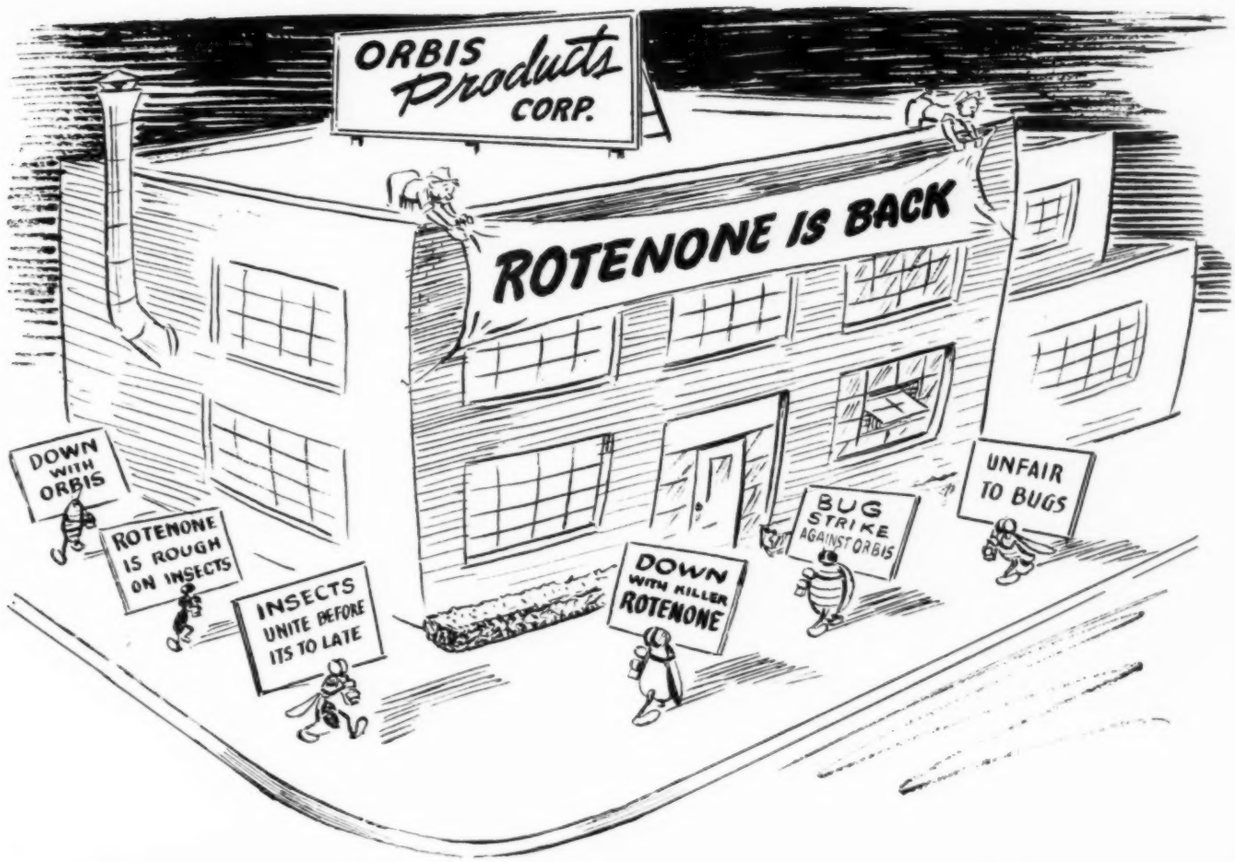

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50% Micronized Dust—for use in the manufacture of agricultural dusts, flea and ant powders, animal louse powders.

50% Wettable Powder—for use in the manufacture of agricultural wettable sprays, dairy and barn sprays, greenhouse sprays, animal sprays and dips, special spray formulations.

30% Oil Concentrate—for use in the manufacture of residual type insecticides, space type household sprays, bedbug residual sprays, other special DDT formulations.

25% Emulsifiable Concentrate—for use in the manufacture of dairy and barn sprays, animal sprays and dips, poultry house sprays, swine and swine house sprays, mosquito sprays and larvacides, horticultural sprays.

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hexaethyl tetraphosphate

effective for control of aphids, "red spider" and "citrus" mites

New to the United States, Hexaethyl Tetraphosphate is already being produced in commercial quantities by Monsanto. When properly formulated, the value of this chemical (originally used in Germany, under the name "Bladan") has been demonstrated by Monsanto in laboratory and field tests as an effective control for aphids, "red spider" and "citrus" mites; it also shows promise as a control for other damaging insect pests . . . Samples and available information will be supplied . . . Write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South 2nd Street, St. Louis 4, Missouri.

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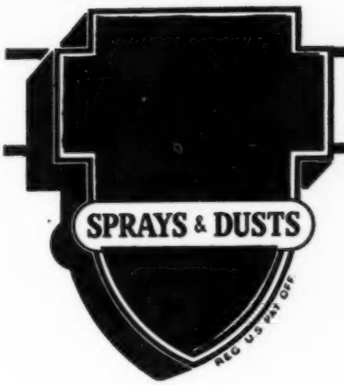
DDT PRODUCTS



"Standouts" for Field Performance

From coast to coast—in orchards and in fields—General Chemical DDT Sprays and Dusts have stood out for all around efficiency. These materials were formulated after broad studies and investigations . . . augmented by nearly 50 years' experience in producing insecticides and by long and close association with growers in their uses.

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GENITOX* S50: Contains 50% DDT milled with a carrier that was selected after extensive investigational work in the laboratory and field. Genitox S50 is of micro-fine particle size and is formulated in such a manner as to give maximum spray efficiency and high deposit of the insecticide on fruit and foliage without excessive run-off. As well as being used throughout the country on certain fruits and vegetables, Genitox S50 also has wide application for spraying barns, cattle, farm and commercial buildings.

GENITOX* D50: A 50% DDT powder intended primarily for manufacturing use in the preparation of agricultural dusts and household insect powders. Its carrier was selected for its dusting efficiency, also for its ability to combine easily and well with other DDT carriers as may be used by dust mixers or compounders of insect powders.

GENICOP* SPRAY POWDER: A combined Insecticide-Fungicide of outstanding merit that offers the grower high spray efficiency, economy and time-saving convenience. Genicop Spray Powder is a concentration of DDT and Neutral Copper—no carrier. It is of exceptionally fine particle size and is put into the spray tank right from the package. Designed particularly for potatoes, this spray powder will find uses on other crops. Genicop Spray will control early blight, late blight, potato beetles, flea beetles, leaf hoppers and psyllid. It will show the way to high yields of potatoes.

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GENITOX* DUST MIXTURES: Various formulations containing DDT alone and in combination with copper, sulfur, etc. All dusts are made fine and free-flowing for maximum dusting efficiency and protective plant coverage.

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GENITOL* OIL CONCENTRATES: For the compounder of oil-base plant sprays; also the manufacturer of fly and mosquito sprays and similar materials. Write for specific information about these concentrates, the various solvents they may be mixed with to make ready-for-use sprays, and other pertinent data.

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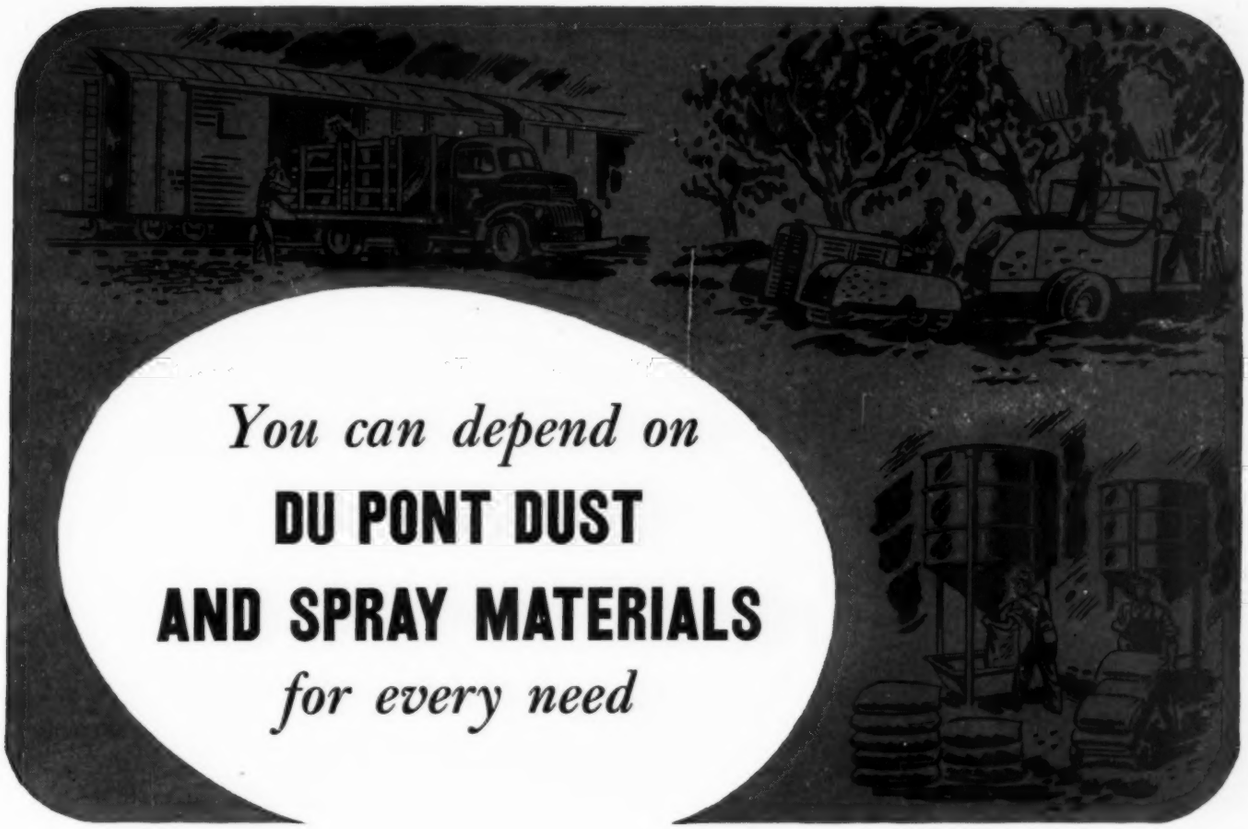

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for every need

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DEENATE* "50-W" DDT Insecticide. The all-round DDT for most spray jobs. 50% DDT quick-mixing wettable powder. Du Pont DEENATE DDT is also available in four other easy-to-use forms.

FERMATE* Fungicide. New organic fungicide. 70% active ingredients. Controls tobacco blue mold, apple scab and rust, brown rot and leaf spot of cherries, anthracnose on beans and tomatoes, and blights of celery and tomatoes. Spray or dust.

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COPPER-A Compound. An excellent fixed copper fungicide for spraying or dusting potatoes, tomatoes and celery to control blights. Has high copper content—yet low solubility makes it safe. Controls leaf spot of cherries. Use also for apples.

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DU PONT PEST CONTROL PRODUCTS

For the Harvest of Better Crops

PENICK BASIC INSECTICIDES

"nip 'em in the bud"

Whether they fly, hop or crawl on the plant itself — whether they creep or walk, or run — whether they are grubs, worms or insects, PENICK has an effective basic insecticide, which, when mixed for the particular need, will "nip 'em in the bud."

Continuous tests conducted in our research laboratories prove the potency and toxicity of PENICK insecticidal bases.

PYRETHRUM POWDER: Our product assays .5% to 1.3% pyrethrins. Here is a range suitable to your needs. Many growers prefer it.

IMPREGNO: The pyrethrins are coated on the outside for efficiency and economy. Impregno is a dust concentrate with pyrethrins 2% and reduced by mixture with clay. Sulphur may be used with Impregno and talc if desired or required.

PYREFUME SUPER 20: assays 2 grams pyrethrins per 100 cc. PYREFUME SUPER 40 assays 4 grams per 100 cc. PYREFUME 100 assays 10 grams per 100 cc. All PYREFUME extracts are available in kerosene, odorless petroleum distillate base, pine oil, alcohol and ethylene dichloride.

FOLIAFUME: a combination pyrethrin-rotenone plant-spray concentrate for repackaging under your label. A pre-war favorite — ready to work again.

SABIDILLA SEED: in powdered form and formulated. An excellent leaf hopper control and for other use which manufacturers should investigate.

DDT 50% solution for residual spray; 50% dispersible or wettable powder 30% emulsifiable and DDT specialties.

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THE EDITOR COMMENTS

A NEW model uniform state insecticide law has been drafted. As the result of cooperative action between the Council of State Governments and the U. S. Department of Agriculture, a model proposed act has been drawn up for recommendation to state governments. This action is something of an aftermath of the failure of the new federal economic poisons bill to pass the last session of Congress. Its purpose is to give those states which had been awaiting passage of the federal law before drawing up new insecticide acts of their own, a uniform basis on which to work.

Industry and the trade associations are also cooperating closely in working over the preliminary draft of the new proposed state act. It is hoped that the model law when completed may set a pattern upon which a new federal act may be worked out at the next session of Congress. The promptness and dispatch with which the men of the Department of Agriculture have acted to head-off unsuitable state insecticide legislation by presentation of the proposed uniform law is certainly to be commended.

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NEW ramifications in custom spraying now appear in various parts of the country. Indiana reports tell of a farm equipment dealer going into custom spraying to serve his community, thus demonstrating the newest in application equipment on a very practical basis. News from Idaho tells of some 46 custom sprayers who have been concentrating on a campaign for "fly-free" barns, reported doing barns for an average of ten dollars per farm. In parts of New York State, custom whitewash sprayers are slanting their interest more in the direction of long-term pest control. On the West Coast, the activities of custom spray specialists are expanding.

With new chemicals and new application equipment rapidly developing, insect and plant disease control becomes more technical and involved as time goes on. The expanding activities of specialists in custom spraying appear to be a natural and significant development which has probably just begun.

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INDUSTRY is always impatient with the deliberations of researchers, be they privately employed or government men. Sales managers without technical training and anxious to get new things to market in order to beat competition, are prone to complain at delays of research men in flashing the green light. And if recommendations are negative, the research people are just no good. For isn't research to find new things,—and quick? New things that the sales department can sell at fat profits? And if research results are mostly negative, how can the workers know anything at all?

The guest editorial of Dr. Annand, Chief of the Bureau of Entomology & Plant Quarantine, which appears on the next page, reminds us of the head of a well-known insecticide firm who several years back complained constantly at the "lack of results" by his company's research staff. Project after project gave the answer, "no." And when a competitor announced a "new and revolutionary" product with much blaring of trumpets, this manufacturer just about blew a gasket in anger at his own staff.

But before a year had gone by, the new product then widely distributed in finished goods all over the country was adjudged highly unsafe. Its premature release for public use cost thousands of dollars in returned goods and law suits, not to mention the untold damage done. From that time on, we never remember the manufacturer in question raising even a mild squawk about the "lack of results" of his or other research people. He realized that it could have happened to him.

In this day of fast-moving new developments, we feel that haste should be made more slowly than ever. Impatience with state or federal government, or private researchers for delays in approving new things is out of place. Their great care and caution have probably saved many a manufacturer headaches which he has never even known about.

A guest editorial written especially for this issue of Agricultural Chemicals

Patience Essential In Testing New Insecticides

By P. N. Annand

Chief, Bureau of Entomology and Plant Quarantine
United States Department of Agriculture

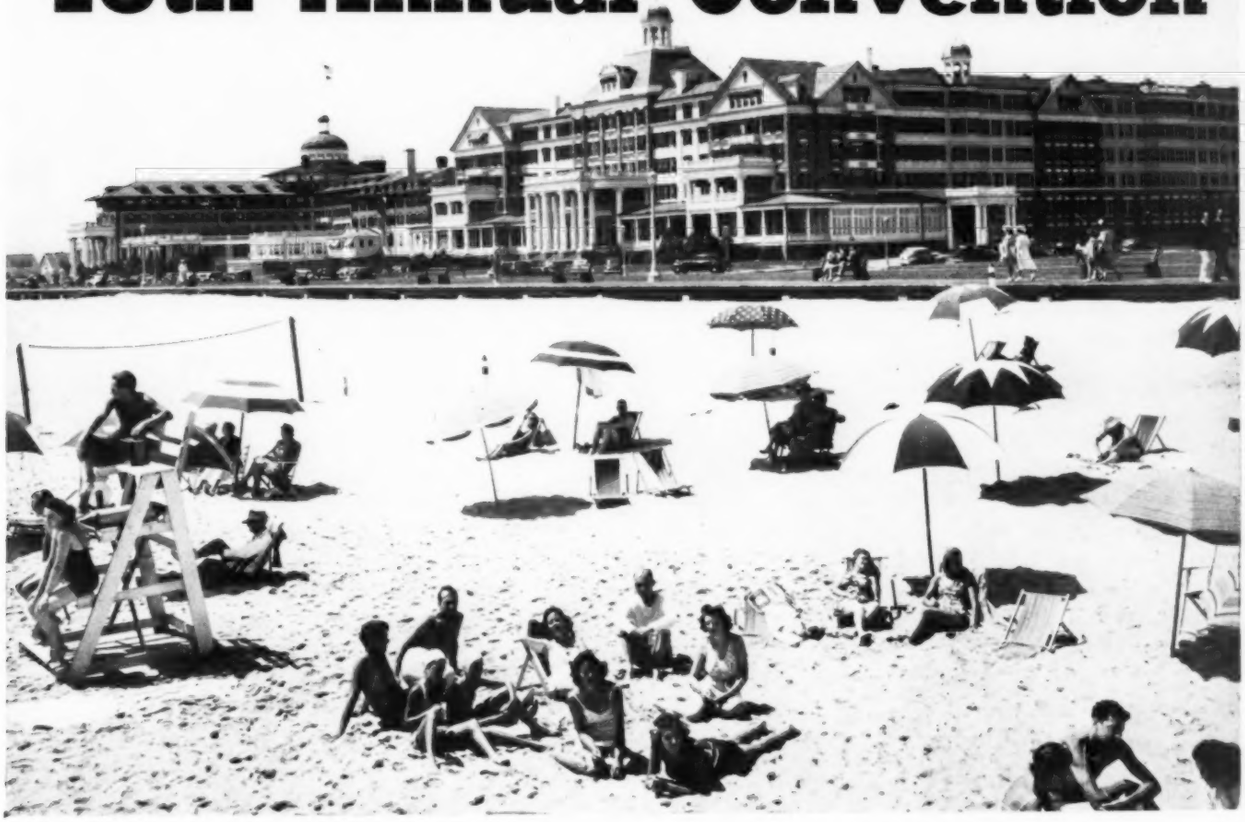
RESEARCH agencies have never before been so pressed for information on the value and utility of new materials for insect control as they are today. The impetus given by the war to the search for new chemicals for special purposes and for new uses for old chemicals has resulted in a multitude of materials and combinations of materials thought to have insecticidal properties or to be of value as adjuvants, synergists, spreaders, or diluents. Industry, as well as the public, has become insect conscious. The insecticide field has been broadened by the increased variety of materials. Companies not previously interested in insecticide manufacture have found certain of the raw materials to be within the scope of their interest and their plant specialization. They have entered the field frequently as a sideline, the hope often being expressed that cheap by-products may be developed as insecticides.

With the broadened chemical base and the increased interest in the field, there is an insistent demand for testing the new materials and for establishing them as recommended by research agencies for public use. There is some impatience with the slowness with which State and Federal research agencies, to which the public looks for recommendations, give their stamp of approval to new materials, and with the delay in developing formulations recognized as satisfactory for control of specific pests. Much of this impatience is a result of a lack of appreciation, by many, of the numerous factors which must be considered and of the complexities of insecticide research. This is illustrated by an inquiry which came to me from a certain company asking that we send a dozen living grasshoppers to be used to determine if a by-product of its plant was a satisfactory poison for inclusion in grasshopper bait. This example, I am thankful to say, is not representative of the industry's attitude toward insecticide research.

What is required to enable a research laboratory to give its stamp of approval to a new insecticide or combination? Why should a period of two or three or more years be required instead of as many months to establish the value of a chemical as

(Turn to Page 65)

AIF Association Holds 13th Annual Convention



The Essex and Sussex Hotel, Spring Lake, N. J.

IN keeping with the importance of Agricultural production in a post-war world, the Agricultural Insecticide and Fungicide Association presented a well-planned program at its 13th annual meeting held at the Essex and Sussex Hotel, Spring Lake, N. J. The meeting was a three-day affair, beginning September 3, 1946.

Speakers representing a wide range of experience in the field addressed the group during each of the two days, covering topics dealing with merchandising problems of national and local nature, and matters of supply and production of insecticides and fungicides for agricultural use. Marketing and distribution were discussed at length.

Election of Directors of the AIF Association was begun during the first day, with the ballot box opening at 10 o'clock in the morning, and closing at noon the next day. Committee meetings, called by the respective chairmen, were held during the course of the initial day, and the Board of Directors held its annual meeting.

Wednesday's session was called to order by AIF Association president, G. F. Leonard of Tobacco By-Products Co., Louisville, Ky., following which L. S. Hitchner, Association Executive Secretary, gave his annal report. Later in the morning, Clifton A. Woodrum, president of American Plant Food Council, Inc. addressed the group on the timely topic of "The Private Enterprise System." Mr. Woodrum was for nearly a quarter of a century a member of the House of Representatives, retiring a year ago to head the Plant Food Council organization.

The Association's technical committee chairman, Dr. L. Gordon Utter of Phelps-Dodge Corporation, gave a report of the activities of that group, emphasizing the strides being taken in development of new methods of agricultural pest control.

A discourse on "What Cattlemen Want in Livestock Sprays" was presented by Ray L. Cuff of the National Livestock Loss Prevention Board, Kansas City, Mo. Mr. Cuff, from his broad experience with cattle raisers in the southwest, revealed a thorough knowledge of the needs of this group, and told of methods being used in applying livestock pest control materials at the present time.

George F. Leonard
President AIF Association

George Krieger
American Petroleum Institute

Dr. D. O. Hamblin
American Cyanamid Co.

Dr. D. O. Hamblin, Medical Director of American Cyanamid Company, New York, addressed the assembly on the subject of "Toxicology." Dr. Hamblin, a fellow of the American Medical Association, American Association of Industrial Physicians and Surgeons, and American Public Health Association, is also a fellow and vice-president of the American Association of Occupational Medicine. His talk was on the topic of "Toxicology of Insecticides and Fungicides."

A noon-time talk by George Krieger, chairman of the Agricultural Development Committee, American Petroleum Institute, covered the Oil Industry's Farm Program. Mr. Krieger has the distinction of having received the first degree ever awarded by Virginia Polytechnic Institute for professional agricultural engineering. He is also former chairman of the fuels and lubricants committee of the American Society of Agricultural Engineers.

Following lunch, the business sessions adjourned for the annual golf tournament under the chairmanship of Henry Wood, and committeemen Russell B. Stoddard and William F. Hall.

Wednesday evening's gathering was held at the Beau Rivage, cafe-restaurant near the Essex and Sussex Hotel, scene of the majority of the business sessions. Guest speaker at the stag affair was Hon. Willard H. Allen, Secretary of Agriculture of the State of New Jersey.

Thursday, the final day of the meeting, was opened by President Leonard, whose remarks were followed by a report of the Membership and Information Committee. Ernest Hart, chairman, made the report.

Allen B. Lemmon, Chief of the Bureau of Chemistry, California State Department of Agriculture, told the group of the administration of the California economic poisons law, describing the problems peculiar to that section and the methods employed to solve them.

The report of the AIF Legislative Committee was next heard by the assembly. The report was presented by L. L. Hedgepeth of Pennsylvania Salt Company, Philadelphia, Pa.

The Hon. John W. Flannagan, Chairman of the House Agricultural Committee was scheduled to speak Thursday morning, but a late change in plans forced cancellation of the talk. Mr. Flannagan is a veteran member of Congress, having been in office reguarly since 1930. He was

New AIF Association Members

The Agricultural Insecticide and Fungicide Association was scheduled to announce an expanded membership at the convention, with the addition of a significant number of new firms on the roster. Included among the new members are the following:

J. T. Baker Chemical Co., Phillipsburg, N. J.

Onyx Oil & Chemical Co., Jersey City.

McLaughlin Gormley King Co., Minneapolis.

Crop-Saver Chemical Co., Chicago.

Carbola Chemical Co., Inc., Natural Bridge, N. Y.

Agricultural Supply Co., Grand Forks, N. D.

J. R. Watkins Co., Winona, Minn.

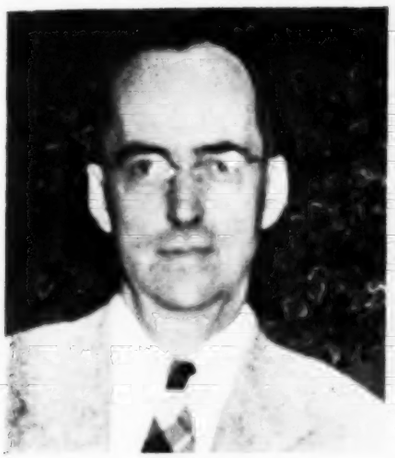
Orbis Products Corp., New York.

Apothecaries Hall Co., Waterbury, Conn.

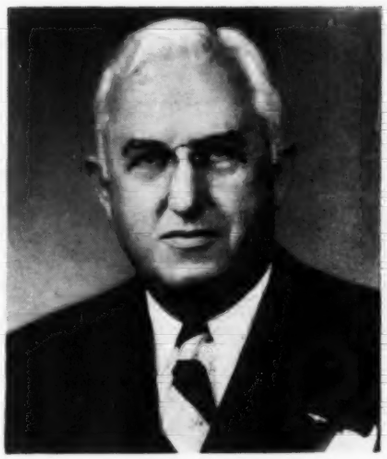
Farm Bureau Services, Lansing, Mich.

Carbide & Carbon Chemicals Corp., New York.

Long Island Produce & Fertilizer Co., Riverhead.



Allen B. Lemmon
Chief Calif. State Dept. of Agriculture



Clifton A. Woodrum
Pres. American Plant Food Council

Hon. Willard H. Allen
N. J. State Secretary of Agriculture

sponsor of the new Federal Insecticide Bill which bears his name.

An informative address on "New Insecticides' was given by Dr. F. C. Bishopp of the Bureau of Entomology and Plant Quarantine. U. S. Department of Agriculture. Dr. Bishopp's remarks were drawn from his long experience in the field of entomology in which he has attained a broad reputation.

Shortly before the morning's adjournment for lunch. the group heard Edward R. Eastman. Editor o' the "*American Agriculturalist*" and president of the corporation of that name. Mr. Eastman's publication is known for its progressive outlook in the agricultural field. His subject: "Bugs and Bureaucrats."

Thursday's luncheon meeting featured a talk by Felix H. Wormser. Secretary of the Lead Industries Association. New York. who discussed the lead industry in general. and lead arsenate producers in particular.

Following the luncheon. the newly-elected members of the Board of Directors met in the president's suite for an organizational meeting.

The convention as a whole was termed "outstanding" by AIF officials who announced a heavy registration. and a deep interest on the part of members to receive all the information possible from the speakers.

AIF ANNUAL MEETING

PROGRAM

TUESDAY, SEPTEMBER 3, 1946

Balloting for election of Directors.
(Box opens at 10 a.m.. closes at noon. Sept. 4).
Committee meetings. as called by respective chairmen.
Meeting of Board of Directors.

WEDNESDAY, SEPTEMBER 4, 1946

10:00 a.m. Meeting called to order by President G. F. Leonard.
10:15 a.m. Report by Lea S. Hitchner. Executive Secretary.
10:30 a.m. Address by Clifton A. Woodrum. "The Private Enterprise System."
11:00 a.m. Report by Dr. L. G. Utter of Technical Committee.
11:15 a.m. Address by Ray L. Cuff. "What Cattlemen Want in Livestock Sprays."
11:45 a.m. Address by Dr. D. O. Hamblin. on "Toxicology."
12:15 p.m. Address by George Krieger. "The Oil Industry's Farm Program."
Lunch.
2:00 p.m. Golf tournament.
7:00 p.m. Stag Dinner at Beau Rivage. Guest speaker. Hon Willard H. Allen.

THURSDAY, SEPTEMBER 5, 1946

10:00 a.m. Meeting called to order by President G. F. Leonard.
10:15 a.m. Report by Earnest Hart of Membership and Information Committee.
10:30 a.m. Address by Allen B. Lemmon. "Administration of the California Economic Poisons Law."
11:00 a.m. Report by L. L. Hedgepeth on Legislative Committee.
11:45 a.m. Address by Dr. F. C. Bishopp. "New Insecticides."
12:15 p.m. Address by Edward R. Eastman. "Bugs and Bureaucrats."
1:00 p.m. Luncheon meeting. Guest speaker. Felix H. Wormser.
3:30 p.m. Organization Meeting of new Board of Directors.

New Developments in

GYPSY MOTH CONTROL

By Ralph Sheals

Bureau of Entomology and Plant Quarantine
United States Department of Agriculture

DURING June and July of 1945 the hardwood forests on more than 1,250 square miles in the New England States presented a landscape effect similar to what might be expected in late November. The foliage had been stripped, not by any action of man nor by any quirk of New England's changeable climate, but rather by insects commonly known as gypsy moths.

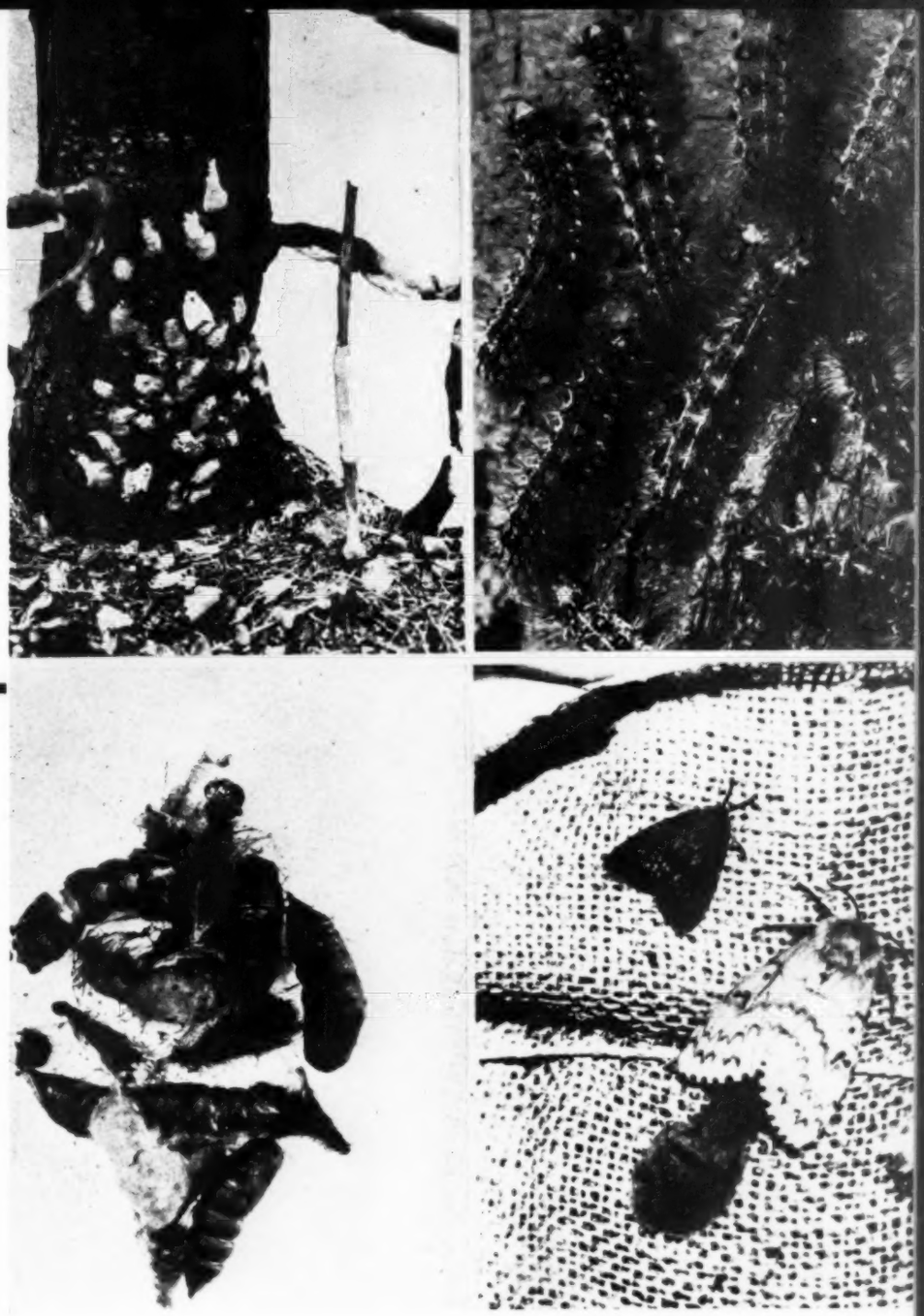
Before the days when plant pest quarantines were in effect, this insect was brought from Europe to the vicinity of Boston, Massachusetts, by a scientist who hoped to establish a silk industry by crossing gypsy moths with silkworms. That objective was not attained. However, gypsy moths thrived on New England's forest and shade trees and despite valiant efforts on the part of Federal and State entomologists and conservationists gradually invaded additional territory. It now occurs throughout all but the extreme northern and southwestern portions of New England and has gained a foothold in eastern New York State. There is also an isolated infestation in the Wilkes-Barre-Scranton area in northeastern Pennsylvania.

For several years Federal participation in gypsy moth control has had as its objective the elimination of the infestation in Pennsylvania and prevention of further natural spread of the pest from the westward limits of infestation in New York and New England. This control work has been conducted under supervision of technically trained men as part of a coordinated, organized effort in which Federal and State agencies concerned participated on a partnership basis.

The life history and habits of the gypsy moth are particularly favorable for effective application of control. Its entire development from egg to adult occurs above the ground. The pest is conspicuous in all stages. The principal methods of spread are through movement of materials on which egg masses are deposited and by wind carriage of larvae in early stages of development.

For years the control of gypsy moths involved the use of arsenate of lead applied with high-powered spray

High-velocity blower mounted on a truck distributing DDT in effort to control gypsy moth infestation. Note apparent force with which the material is ejected. (Photo courtesy of U. S. Department of Agriculture.)



Life stages of gypsy moth. Upper left: clusters of eggs on a tree. The clusters average about 400 eggs each. Upper R.: larvae or caterpillars almost full grown; Lower L.: the caterpillars have transformed into pupae. Lower R.: male and female moths, the latter depositing an egg cluster.

equipment. In fact, this insecticide was developed primarily for combating gypsy moths, and a significant part of the progress made in development of spray units from the hand-operated barrel pump to the horse-drawn power sprayer, and then to the modern motorized, high-power equipment capable of maintaining pressures sufficient to propel dilute sprays to the tops of the tallest trees in the east, stems from efforts to develop more effective control of gypsy moths. The Worthley spray nozzle was developed for use on this project.

For several years prior to 1942, the annual use of arsenate of lead for gypsy moth control averaged approximately 800 tons. Of this amount, about 600 tons were used annually by State and municipal agencies in infested areas east of the region where Federal-State cooperative control was conducted. The insecticide was applied on a per acre basis at rates varying from 30 to 50 pounds in 600 gallons of water with an adhesive, usually fish oil, added. The spray could not be applied until about May 15, when foliage had become well developed. Control operations continued until the latter part of June, when the insect went into the pupal stage. In forest areas occasionally it was necessary to place lines of hose more than two miles from the location of the spray unit. Operations frequently required hose lines one or more miles in length. To carry on work of this nature required an operating crew ranging from 10 to 15 men per spray unit. Under average forest conditions, from 200 to 300 acres were treated during a control season by each unit. The per acre cost ranged from $15 to $25, depending on the nature of the terrain, forest growth, and other factors.

Cryolite Offers Control

DURING 1942, Cryolite largely replaced arsenate of lead in the area where cooperative Federal-State control was performed, primarily because its use at the recommended rate did not create a hazard to livestock that might have access to treated areas. The use of cryolite slightly increased the per acre cost of insecticide application, since it was necessary to apply at least 60 pounds to obtain effective results. However, this was more than compensated by elimination of the need for erecting fence lines, which was necessary when arsenate of lead was applied, especially in the immediate vicinity of pastures.

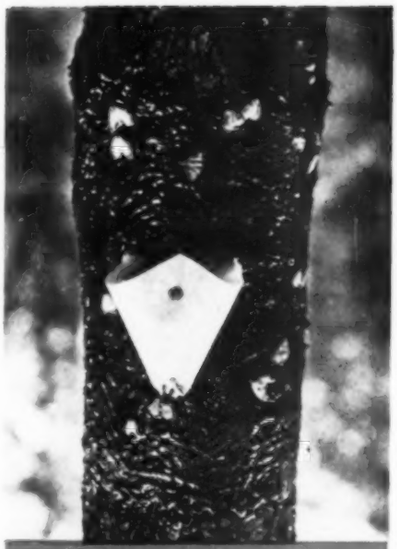
Other methods of control used more or less extensively up to and including 1942 involved the use of

tree banding materials such as tanglefoot and a black, greasy substance similar to the product known as Raupenleim that has been used in German forests for many years in combating gypsy moths and certain other forest insect pests. Trunk bands of such materials are effective in preventing caterpillars from ascending trees. A considerable proportion of the larvae massing on tree trunks beneath the bands died from starvation or from a disease which is frequently prevalent under such conditions of concentration.

Also during the period when gypsy moths were in the larval stages, trees were banded with burlap loosely tied around the trunks to attract caterpillars seeking shelter during hot, sunny days. Those congregating under the folds were crushed at frequent intervals by patrolling inspectors. During the fall, winter, and early spring when the moth is in the egg stage, a control material, the basis of which is creosote, was used extensively in treating the conspicuous egg clusters. The areas on which treatments of the various kinds refered to were selected on the basis of information obtained through survey procedures. One such method, which is of special interest to chemists, consists of the use of a sex attractant. The material is obtained by clipping the last two abdominal segments of virgin female gypsy moths. Chemists of the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture treat this material by hydrogenation. This process appears to stabilize and increase its attractiveness to male gypsy moths. Usually less than a fluid ounce of solvent containing a small quantity of the sex attractant absorbed in cotton and protected by a conical paper container is placed in the center of a sheet of paper treated with tanglefoot, which is securely attached to a tree trunk. While the exact distance from which male gypsy moths are attracted to such traps is not known, it is believed to approximate one-half mile. The catching of a male moth in such a trap is not proof of an established infestation, since such moths are known to be carried by wind currents for considerable distances. However, information is obtained upon which manual types of surveys are based. This sex attractant survey has been used for many years, but it is only during recent years that the material was improved by chemical treatment and used extensively as a very important adjunct to planning and conducting the control program.

The elimination by 1929 of the gypsy moth from an area involving more than 100 square miles in New Jersey is proof of the effectiveness of the control and survey measures outlined above, but the chances of holding the pest within its established bounds, or of prosecuting a more aggressive type of program did not appear very promising until the advent of DDT.

Only limited tests were necessary to learn that DDT was extremely toxic to gypsy moths. In 1944 DDT was applied on two areas involving a total of 25 acres at the rate of 5



Gypsy moth trap. The scent lure is placed inside the paper cone. Male gypsy moths are attracted to it from a considerable distance and caught in the sticky material smeared on the trunk of the tree.

Below (left) Half the area shown in photo was sprayed with DDT on May 29, 1946, using turbine blower. Defoliated area on far side of road was not sprayed at all. A graphic example of gypsy moth control in infested area.

Below (right): Closeup of defoliation by gypsy moth. Department of Agriculture estimates indicate that in 1945, about 800,000 acres in New England states were from 25 per cent to 100 per cent stripped of leaves by the pest.

pounds in 5 gallons of oil solvent per acre. In both areas gypsy moths were eradicated. Further research on several thousand acres during 1945 proved that in many test areas complete control was attained with application of one pound of DDT. or even less, per acre in one gallon of oil solvent. In these experiments the concentrate spray solutions were applied in finely atomized form by special types of distributing devices attached to biplanes. by new and novel types of spraying devices involving the principle of conveying the concentrate solution by air velocity. and by knapsack sprayers. Research also demonstrated that the crystalline deposits of DDT were effective against gypsy moths for a period of approximately six weeks after application. and that they persisted on foliage. bark. stones. and ground litter after exposure to repeated and heavy rainfalls. Experimental work participated in by various cooperating agencies disclosed that little. if any. injury to fish. birds. or other wildlife is likely to result from even extensive application of DDT to forests at dosages of one pound. or less per acre.

With such experimental data available. the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture and its cooperators in New York and Pennsylvania revised the control program for the current year and applied DDT from aircraft. blower machines. and knapsack sprayers on more than 125 square miles of infested area. including several entire townships. No other type of control was used extensively. The control program was started on April 1. or approximately six weeks earlier than would have been practicable with materials and methods previously available. The work is still too experimental to attempt to compare cost of applications of DDT by the various methods with that of materials and procedures previously used in gypsy moth control. However. it is known that there will be a very substantial reduction in cost.

USDA use of sprayers, attractants, planes, other controls, has eliminated gypsy moth entirely in some areas

During the current year four biplanes owned by the Bureau. one by the cooperators in New York. and five hired from contractors. treated nearly 100 square miles of forest area. Windsocks were placed especially on higher elevations at distances sufficiently close together so one or more such markers were visible to the pilots at all times during flight. In especially rough terrain. gas filled balloons were used to facilitate operations. The season's work fully demonstrated the practicability of extensive use and economy of aircraft in gypsy moth control.

The blower machines were used during 1946 in applying DDT on roadside trees. woodland margins. and small wooded tracts estimated to approximate 25 square miles. Men assigned to this phase of operations estimate that at least 12 of the standard types of spray units previously used on the project would be required to treat the acreage covered by one of the blower devices for identical periods of operation.

In treating small. isolated tracts. back yard plantings. refuse dumps. stone walls. and other similar types of sites knapsack sprayers were used effectively. While the use of such sprayers will be rather limited on gypsy moth control. the method provides an economical means of combating the pest in areas not adapted for any other type of control.

Final appraisal of the results of the current year's work will not be available until leaves of deciduous trees fall and inspection for survival of the pest can be made when it is in the conspicuous egg mass stage. However. careful observations throughout the control season have disclosed pest survival in only a few of the isolated tracts where knapsack sprayers were used. and in only three of the areas treated by aircraft. The latter sites were retreated.

While it has been determined that DDT is much more effective against gypsy moths than any other control material previously used. it must be recognized that additional work is needed before the full effect of its use and methods of application on subsequent gypsy moth control can be fully evaluated. Operations so far have been restricted largely to areas where coordinated and cooperative control programs are and have been under way. All work has been performed by trained operators under very close supervision. It may be desirable to continue to carry out effective and aggressive control of pests such as gypsy moths in that manner.

Based on three years' experience with DDT in combating gypsy moths. the writer believes the future has a rose-tinted aspect. It may not be many years before Pennsylvania is freed from this destructive pest. and a more aggressive program initiated in New York and New England. with the Atlantic Seaboard as the final scene of operations. Such a worth while objective can be visualized only through the coordinated efforts of Federal. State. and local pest control agencies. the public. and industry. to which we look for even more effective insecticides and methods of applying them.★★

The Future of Pyrethrum

as an agricultural insecticide

SINCE DDT and some of the newer insecticides have come on the market, there has been a general feeling in certain quarters that some of the old standby insecticides will lose their place in controlling insects. This is especially true in the agricultural field where the amazing properties of these new insecticides have led many to believe that products such as pyrethrum and rotenone are on their way out.

Don't believe it! Pyrethrum and rotenone are here to stay for a long, long time. Admittedly, DDT will affect the status of these two materials, but pyrethrum, we can say with assurance, will still have a very definite place in any insect control program. Its specific merits as an insecticide guarantee that it will continue to be widely used in both the household and agricultural field, in spite of the increasing use of the newer toxic materials. Let's review a few of the many reasons why pyrethrum will continue to be widely used.

Basically, it is well known that DDT tends to be very slow in its action on insects. Contrast this for a moment with the rapid killing action of pyrethrum. The perfect combination would be a rapid acting material such as pyrethrum used in conjunction with a material such as DDT, which while slow in action possesses the important characteristic of high residual toxicity.

Take the following use as an example. The most effective insecticide on the market today for the control of roaches and other crawling insects is a combination of pyrethrum powder with a 10% DDT dust. While roaches may not be an agricultural problem, it is true, the same idea has application in agricultural dusts and sprays.

Actual experiments in this direction are under way this year in which a small quantity of pyrethrum is being incorporated in DDT dusts. The purpose is to evaluate such combinations against DDT alone in the control of agricultural pests on such crops as cabbage, cauliflower, etc. While the results of these experiments have not been published, it is predicted that some such combinations will find practical application.

Or consider the disadvantages of DDT. The material will probably never have the "clean bill of health" enjoyed by a material such as pyrethrum. Consider, too, the specific applications for pyrethrum because of this quality. For instance, while DDT may be used on such crops as cabbage, cauliflower, lettuce, etc., applications must always cease at least a month prior to harvesting. At this point, a pyrethrum application might be indicated because of its nontoxicity to humans.

Another specific application of a pyrethrum powder would be in the control of lettuce leaf hoppers where the grower or operator is hesitant to use a material such as DDT.

Still further evidence of the fact that pyrethrum is here to stay is the role which it plays in solving the insect control problems of the small scale home gardener. Here again, pyrethrum's safety, economy and efficiency assure it of a place of continued importance in the agricultural insecticide industry.

What about the crops on whose insect pests DDT has not so far showed satisfactory control? What about lima beans where DDT does not control either the Mexican bean beetle or the red spider? Won't pyrethrum still have a place in areas where leaf hoppers may be the limiting factor in the production of a clean crop of beans? The answer is a definite "yes."

There are other instances, where because of injury to the crops from DDT, pyrethrum will continue to be used. The cucurbits are a good example. So, too, are tomatoes where pyrethrum must be used for the control of hornworm, pinworm and other insects, because of the rather well-accepted fact that DDT causes a stunting of tomato plant growth.

There is no doubt that pyrethrum will find increasing use in combination with DDT. These pyrethrum-DDT combinations have a great future because of the characteristic irritating action of the pyrethrins. This irritating action of the

Despite new developments in the field of insecticides, pyrethrum continues to hold a prominent position and shows promise of maintaining its future role.

By Dr. J. B. Skaptason

Technical Sales Adviser
John Powell & Co., Inc.

active principles of pyrethrum ($C_{21}H_{30}O_3$ & $C_{22}H_{30}O_5$) drives web-forming insects from cover and into contact with the DDT. Such combinations are therefore indicated for the control of such insects as webworms, leaf tyers, etc. Other similar examples could be given.

On certain orchard crops the use of pyrethrum still is paramount. While it is known that DDT is extremely effective against the codling moth on apples, its use may be limited in certain areas where the European mite tends to build up. Where the apple leaf hopper is abundant, it is necessary to use pyrethrum for its control. The same program would contribute toward the control of certain of the apple aphids as well as some control of the codling moth.

The pyrethrins, those two compounds mentioned before which are the active principals present in pyrethrum powder, are more toxic to insects—weight for weight—than any of the newer insecticides. This statement, in itself, is an indication of the continued use of pyrethrum in one fashion or another.

This very factor alone—the extreme toxicity of the pyrethrins—should be a stimulus toward improving our present method of processing pyrethrum. It should also act as assurance of the continued popularity and use of pyrethrum. One such improvement has already been made which tends toward the wider application of pyrethrum. This is the discovery and development of the use of a synergist with pyrethrum. In this process the action of the pyrethrins has been augmented, increasing their killing power by two to three hundred per cent. At the same time all of the original desirable characteristics of pyrethrum—freedom from odor and irritation, elimination of toxicological hazards and high efficiency—are retained.

Synergists, it might be mentioned, not only enhance the value of pyrethrins in powders and dusts, but also in the form of extracts.

Aerosols in Picture

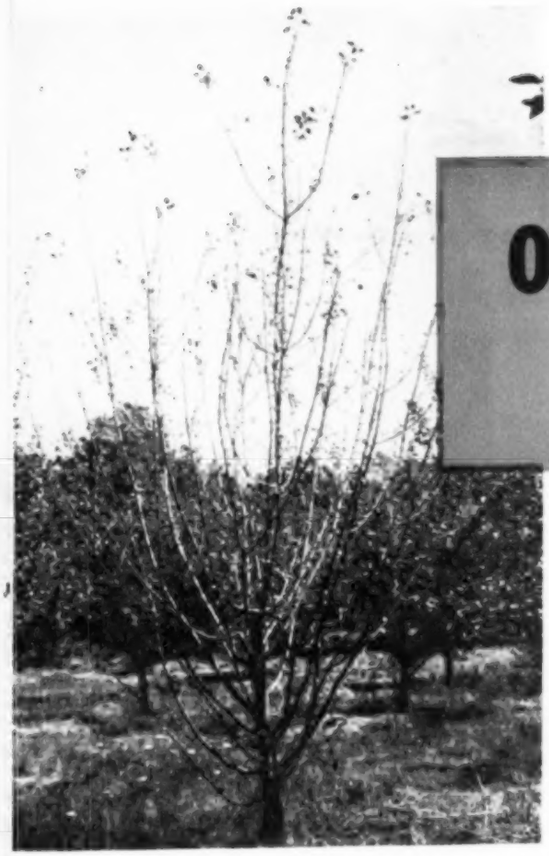
WHILE aerosols may not fall wholly within the agricultural application of pyrethrum, the subject is worth mentioning. The use of DDT in aerosol form probably would not have the popularity it has today without pyrethrum incorporated into the formula for rapid knockdown. The very use of pyrethrum in this fashion has led to the manufacture of improved concentrates of pyrethrum extract of higher toxicity. The use of pyrethrum in such formulations will certainly increase the amount of pyrethrins being used in aerosol form.

Fortunately for the agricultural field, the supply outlook for pyrethrum is good. A wartime casualty, when scarce stocks on hand had to be stretched in many ways, pyrethrum is once more finding its way to the United States in substantially increased volume from production areas. The acreage of pyrethrum flowers in Kenya, Africa, for instance, increased from 27,000 to 60,000 acres during the war. Prices, which went up slightly during the war, have been maintained at the same levels. Indications for the future point definitely to lower prices, a factor which should further enhance the popularity of pyrethrum as an agricultural insecticide.

Yes, pyrethrum still has a place in the agricultural insecticide program—a place for which a hungry, waiting world will be very thankful in the months to come. For pyrethrum still remains the safest, effective insecticide for agricultural use. It is still the answer to insect control on many crops which the new insecticides will not protect. It is still capable of even greater accomplishments in combination with other products. And it is still one of the best "quick knockdown" agents available.

So, if you feel that pyrethrum and some of the other old standby insecticides will lose their place in the agricultural markets of today, remember some of the foregoing reasons why not. Pyrethrum has killing power and, as they say around our place, "that's the thing."★★

Organic Mercury Fungicides as Foliage Sprays



Foliage on Macoun apple tree (lower cut) in July, 1946, after spraying with a water soluble organic mercurial (1: 16,000) compared with an adjacent Macoun tree (upper photo) which had received no fungicide treatment.

A GREAT mass of popular, technical and patent literature has accumulated describing the use of organic mercury compounds as germicides. Yet, it is only very recently that certain water soluble formulations have attained widespread use as foliage sprays because of an unusual property—eradicant action against fungi on living foliage. Liquid lime sulfur for many years has been the sole "curative" fungicide that the plant doctor could prescribe to "burn out" the apple scab fungus in leaf infections. Too often the cure was as destructive as the disease, and hence the use of lime sulfur in some apple growing regions has been almost abandoned. Consequently reliance has been placed on wettable forms of sulfur applied before inoculation periods to serve as a protective fungicidal barrier. Frequently, however, the protectant chemical is not applied at the proper time or washes off to the point where an inadequate fungitoxic coating is left. The grower then finds that the disease has become established to a threatening degree and a therapeutic chemical is required. This use for certain diseases can be added to those already assigned to organic mercury compounds.

The development of organic mercury-containing compounds as a family group for the control of plant diseases has reached a point where they comprise one of the major fungitoxic agents. Because of the highly poisonous nature of mercury fungicides, however, their use has until recently been confined to plant parts which are not eaten. Seed treatment, chiefly cereals with dusts or powders, is very popular and effective. Water suspensions are widely used for ridding seed potato tubers of harbored pathogenic microorganisms, and drenches are applied to soil to control damping off of young plants. Some turf grass diseases have responded to treatment by organic mercurials as dusts or sprays, resulting in the use of these materials on golf courses and lawns. A recent restricted but effective use insofar as decay prevention is concerned is as a disinfectant wash for citrus fruits. However, the development of mercurials for

Frank L. Howard
Plant Pathologist, Rhode Island
Agricultural Experiment Station

foliage sprays had an entirely separate origin.

Granting that war is a destructive process, it does nevertheless force men to constructive works in order to meet the problems which arise. An acute situation for which we were unprepared was a sufficient knowledge of chemicals effective for mildew-proofing of textiles. In the early days of the war a short term research project was initiated at Rhode Island State College on chemicals inhibitory to fungi that attacked fabrics. Screening tests were devised and certain organic mercury salts seemed to meet the specifications then set up. Rationalizing that these extremely potent compounds might have value if non-injurious, in combatting foliage diseases, they were applied as sprays to apples, tomatoes, potatoes, etc. during the spring and summer of 1942. Such phenomenal control of Apple Scab was obtained in this preliminary field trial that during the following winter laboratory assays of the fungitoxicity, phytotoxicity, and tenacity of the initial formulation (phenylmercuri triethanol ammonium lactate) and related derivatives were made.

The fungitoxicity, or property of a chemical to kill or inhibit the germination of fungus spores, was determined by means of a standardized glass slide technique patterned after that recommended by the Committee on Standardization of Fungicidal Tests, American Phytopathological Society[1]. Plotting the results of toxicant dosages against spore germination response on log-probability graph paper, the lethal dose necessary to inhibit 50 per cent (L.D. 50) and 90 per cent (L.D. 90) of the spores of *Macrosporium sarcinaeforme* and *Sclerotinia fructicola* was found by interpolation. The compound that had been used for mildew-proofing textiles was found to have an L.D. 50 at 1 ppm. in water and an L.D. 90 at 3 ppm. in water. As the work of improving the formulation progressed, the potency of the toxicant was raised to the point where one part in 10 million of water would give an L.D. 50 and one-half of one part per million would give an L.D. 90 value. Because of the extreme potency of the initial formulation of phenymercuri triethanol ammonium lactate, it was felt that a practical concentration for use against plant pathogens would lie somewhere between 50 ppm. (1:20,000) and 200 ppm. (1:5000).

[1] Phytopathology **33**: 627-632, 1943.

Study Injury to Plants

THE second step in determining the usefulness of these compounds was to determine their phytotoxicity or the injury that they would cause to the leaf tissues of green plants. The routine method of evaluation used in this laboratory is to prepare a series of dosages as for example, ½ per cent, 1 per cent, 2 per cent and 4 per cent solutions in water and then immersing 10 healthy leaves in each of these concentrations for a period of 5 seconds. At the end of 5 days notes are taken on the per cent of leaf area killed by each of the concentrations. When these data are plotted on log-probability paper, by interpolation the concentrations that will kill 50 per cent of the leaf may be determined. On this basis various formulations can be compared as to their relative phytotoxicity. Our experience seems to indicate that this is a better method than determining the sub-lethal dosage or concentration at the threshold where injury may occur. The latter value can never be determined with exactness because of various factors. It was found that a concentration of 1:10,000 was not noticeably injurious to apple foliage and that control of the apple scab fungus was obtained. Later field tests indicated that con-

Foliage on Macoun apple tree (lower right) in July, 1946, after having been sprayed with soluble organic mercurial (1: 16,000). The branch in lower left photo, which grew near the one in other picture, received no fungicide treatment. Difference in the two is obvious.

centrations of 1:10,000 and in some cases as high as 1:30,000 were adequate for the prevention of apple scab infection. Mercury-containing compounds in general cause defoliation of leguminous crops and the organic mercury fungicides were also found to have this property when tried.

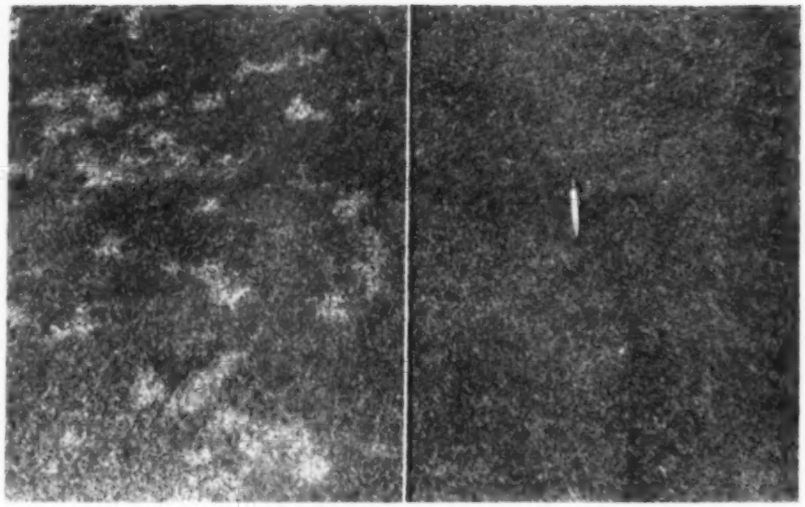
An example of this may be cited where it was found that while in field applications, the organic mercury formulation was effective in vitro for the control of the bacterial blight organisms, an excellent job of defoliation was obtained. In fact, the grower on whose farm this accident occurred was more pleased than disconcerted by the injury and became interested in the use of a mercury-containing compound for causing abscission of the leaves on lima bean plants to facilitate picking of the green beans.

Adherence Importance

THE third, and oftentimes most important, property in a fungicide is its tenacity or ability to adhere to the surface of foliage in spite of washing by rainfall or decomposition by sunlight. Fortunately it was found that some water-soluble organic mercury fungicides had this inherent property to a very high degree. Whereas lime sulfur and most of the other fungicides were quite readily washed from plants, the new mercury product would withstand a great deal of adverse weather conditions and still retain its effectiveness. Laboratory washing tests by the Heuberger method[2] indicated that 120 washings would oftentimes lower the fungitoxicity of the residue on glass slides less than 10 per cent.

The original formulations of organic mercury fungicides were not too stable and after a few weeks or months a heavy precipitate accumulated in the bottom of the containers. Where this had been of little concern in the textile industry, because the mildew-proofing agent was used at once, it was a drawback insofar as agricultural use was concerned.

[2] Phytopathology 30: 840-847, 1940.



Control of "Dollar Spot" of Colonial Bent turf with a 1:10,000 solution of an organic mercurial is seen in photo above, right. On the left hand side is an untreated portion of ground. (Object in right hand photo is a pencil laid on grass to lend perspective.)

To overcome this and obtain a stable form, various types of organic solvents and coupling agents were experimented with until some were found which proved satisfactory in this respect. One source of trouble came from impure mercury-containing intermediates from which the water soluble forms were processed.

Before organic mercury fungicides could be used on an extensive scale on apple trees or other plants, it was necessary to learn more about their compatibility with insecticides, other fungicides, and various salts found in water. Since the toxicant is applied at such high dilutions, it was felt that even a few parts per million of antagonistic salts as found in "hard" water might decrease the fungicidal value of the compound. To obtain information on this point, laboratory tests were conducted which showed that in spite of visible turbidity of the resulting solution, up to 200 parts per million of calcium salts ($CaCl_2.2H_2O$) could be added to a solution of 1:16,000 phenylmercuri triethanol ammonium lactate without significantly decreasing fungitoxicity. Field experience indicates that addition of high concentration of hydrated spray lime is to be avoided to obtain full fungicidal value. Both laboratory and field tests of combinations of organic mercury compounds and DDT showed that the two were compatible in the sense that neither seemed to decrease the fungicidal or insecticidal value of the other. Laboratory tests of combinations of the organic mercurials with summer spray oils indicated that there was no lessening in the disease control powers of the mercury formulations. This proved to be quite important where nicotine-oil sprays were used on apples for the control of coddling moth and with which both sulfur- and copper-containing fungicides often cause severe injury. Trials indicated that the organic mercury fungicides could be added before or after use of the oil spray at certain effective concentrations without material increase in injury to the foliage.

Irritating to Skin

ORGANIC mercury germicides have one serious fault in that they are primary irritants when in the concentrated state. If a solution of one to five per cent of this fungicide happens to come in contact with the skin, a blister is likely to develop. Therefore warnings must be provided on the label advising the user to wash his hands immediately after handling concentrated solutions. It has been our experience, however, that when the concentrate is diluted to an effective spray concentration there has normally been no dermatitic

effect when the skin is exposed. Experience in the application of the diluted sprays at concentrations of 1:5000 to 1:20,000 in trials over a period of four years has never resulted in any discomfort or injury to the several men doing the spraying.

While inorganic and organic mercury compounds have long been recognized as excellent fungicides, their use in spray and dust formulations for the control of disease of edible plants has been avoided because of their poisonous properties to man and higher animals. Yet certain types of mercurials, such as calomel, have been prescribed in medicine for the treatment of specific ailments in man without fatal results when the dosages were carefully regulated.

No tolerance has been established by governmental agencies as to the amount of mercurial residue that can be present in foodstuffs for human consumption. The traditional fears of poisoning from all forms of mercury have prompted a study of the spray residues in order that some concept of the magnitude of quantities retained by apple fruits can be gained.

In order to determine the exact amount of residue retained under various orchard conditions, samples of fruits from various geographical locations and exposed to a varying number of sprays were assembled by the Rhode Island Experiment Station and subjected to chemical analysis. All fruit was kept undisturbed in cold storage until the time of taking samples for chemical analysis. Handling was avoided and only sound fruits were used.

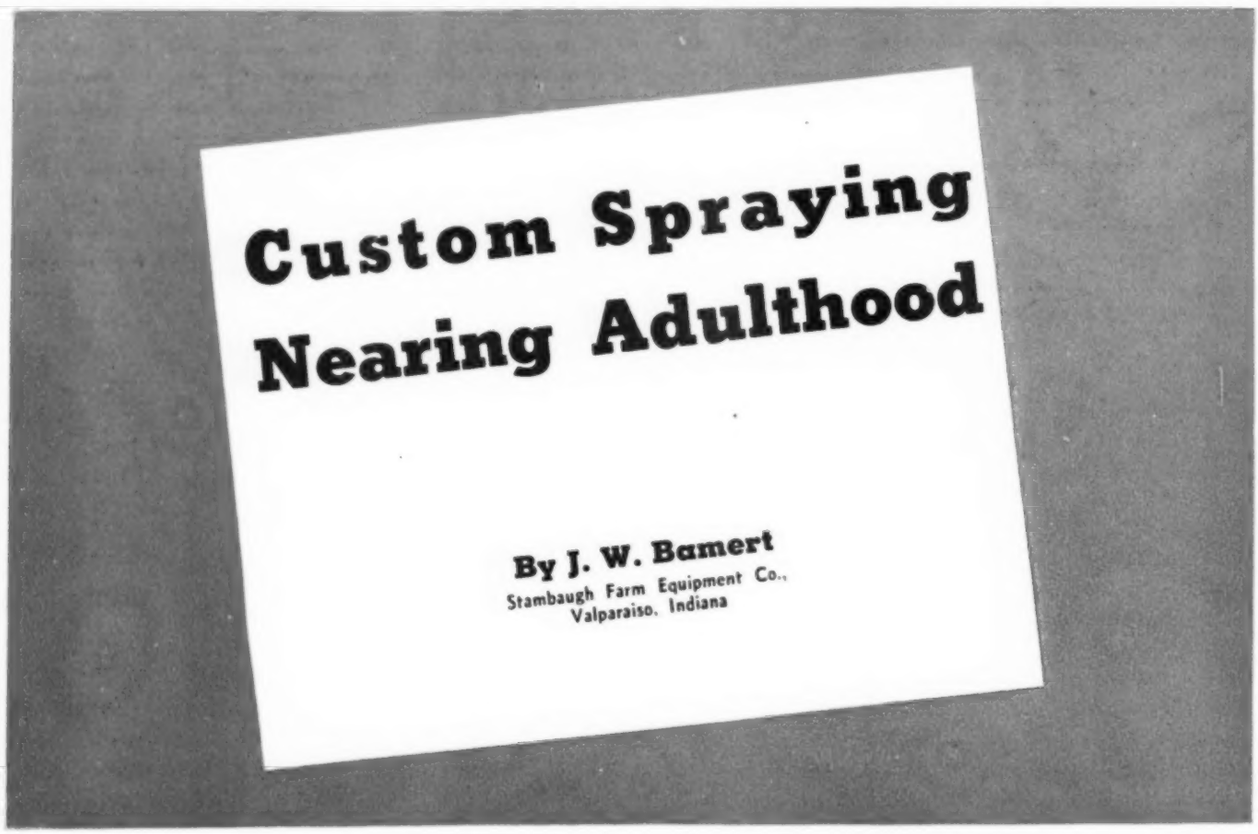
From the 1944 crop, 7 samples of apples were collected from New York, New Jersey, Maine, and Rhode Island. Mercury was determined by the method of T. H. Maren[3]. The conclusions reached by the chemists were that the precise determination of such minute amounts of mercury is extremely difficult. On the basis of the analyses of these apples it appears that even though McIntosh apples are sprayed seven times with a solution containing 1:3620 of phenylmercuri triethanol ammonium lactate, and 56 days elapsed between the last application and picking time, only .00026 grains of mercury as metallic were present in a pound of fruit. The data suggests that traces of mercury may be present in normal unsprayed apples. Inexplicably, one lot of apples sprayed five times with a non-mercurial commercial fungicide contained more mercury upon analysis than a lot from another state experiment station sprayed six times with a 1:7500 solution of organic phenyl mercury.

From the 1945 crop, 25 samples of 5 varieties of apples were gathered from 10 localities and analyzed for mercury residue. Samples were sprayed with a water soluble phenyl mercury compound, or a flotation sulfur, or a commercial organic. Two samples of fruit which had received no mercury fungicide showed, according to the analyses, .0017 ppm. and .007 ppm. of mercury. Where flotation sulfur had been applied at 10 pounds per 100 gallons, .025 ppm. mercury was found in the apple tissue. The fruit sprayed with the commercial organic non-mercurial in two orchards contained .210 and .056 ppm. of mercury, respectively. The water soluble phenyl mercury sprayed fruit varied from .357 ppm. mercury, where three applications had been used and 113 days elapsed between the last application and picking time, in contrast with .023 ppm. of mercury in fruit sprayed seven times and only 38 days elapsing between the last application and picking time. From the data obtained one cannot make any generalization about the amount of mercury residue present on the fruit and the time elapsing between the last application and picking time, or the number of spray applications made during the season. It is felt that prejudice against the use of organic mercury as foliage sprays will be validated or dissolved only by the accumulation of considerable data of this nature and ultimate determination by the governmental agency concerned, of the amount of mercury necessary to cause poisoning of humans.

Most performance records have been an apple foliage for the control of Scab and four years use in the orchard have proved phenylmercury solutions to be among the top performers. Pending more information on the residue problem, the use of organic mercurials must at least for the present be limited to applications where edible apple fruit have not yet developed, as for spray applications up to the first cover. Varying success has resulted from their use for control of the blossom blight stage of brown rot of peaches and plums. Likewise, for the control of fire blight of pears. Reports from other states indicate usefulness in treating diseases of lily bulbs, ornamental trees, shrubs, and nursery stock. Modern organic fungicides appear to be specifics rather than cure-alls. Nonetheless, organic mercurials are being formulated as safe potent foliage fungicides capable of service to the plant doctor in his fight against disease.★★

[3] Jour. Lab & Clin. Med. 28: 1511-1514, 1943.

Human tolerance to mercury residues on foodstuffs not yet set by agencies of government. Prejudice against the use of mercury ends only with research



Custom Spraying Nearing Adulthood

By J. W. Bamert
Stambaugh Farm Equipment Co.,
Valparaiso, Indiana

A COMBINATION of numerous factors in the pest control field has resulted in a definite upswing of interest in custom spraying activities in many sections of the United States over recent years. New insecticides, new fungicides, plant hormones and other chemical preparations are being presented to the agriculturalist in so swift a manner, that in order to keep up with developments, application of these new products must of necessity be in the hands of experts who are thoroughly informed as to most efficient use, as well as cautions to be observed and limitations to be taken into consideration in the application of these new materials.

It is equally important that these new control materials be applied by someone thoroughly familiar with the latest developments in equipment. New methods of application for insecticides, fungicides, fumigants, and weed killers are constantly being introduced. Many methods which for generations have been familiar to the agriculturalist are now obsolete in view of faster and more efficient machines for distribution of chemicals. Again, the individual crop raiser finds it increasingly difficult to keep up with developments of mechanical paraphernalia, not to mention being able to purchase these new types of sprayers and dusters. Efficiency in application would seem to foster the emergence of a larger group of custom sprayers—able to buy and maintain the latest in mechanical equipment for insecticide application, and spreading the cost over many jobs rather than forcing each individual user to absorb the cost on his own perhaps small operation.

With the end of the war and a world-wide emphasis being placed on food production, confusion of the public was very evident in the matter of agricultural chemicals. Stories of "amazing" results from the war areas in controlling insects with DDT, with the attendant publicity terming the insecticide a "miracle" product, brought a rush of customers to retail stores for any product containing DDT in any amount. As late as the end of 1945, many persons believed dichlorodiphenyltrichloroethane to be the cure-all toward which unnumbered generations had reached but had not attained in the matter of insect destruction.

All this led to widespread counter- publicity through which responsible business houses and governmental agencies told the public that DDT had limitations, that it must be intelligently applied to get results, and that the preparation may be harmful if not used correctly.

Custom spraying, often in the past a little-known lightly-considered business, has within the past two years come into its own. With the advanced technical development of agricultural chemicals, the applicator himself has had to become a specialist, and thus it was a natural move for individuals in the farm equipment and similar businesses in rural areas to begin taking orders

for spraying jobs. As a rule such persons had the equipment, the "know-how", and a wide acquaintanceship in the community.

Equipment Firms Come In

THUS it came about with the writer's firm . . . a metamorphosis from a mere "handling" of DDT products to the logical end of launching an insect control program. The idea had to be merchandised, and the prospects had to be educated. Meetings were held in our community, and demonstrations were made with the result that soon our customers were telling others that here was a source of knowledge about DDT.

It soon became apparent, in our experience, that our customers needed and wanted help on how to use and apply new farm chemicals properly. Farmers were not at all sure they knew how to use these new materials safely and efficiently, and their fears were amplified by bulletins and news articles which cautioned against misuse of DDT and other new materials. Most of these agriculturists did not have the time to glean from reams of printed matter the essential truths, so they were happy to have the advice of persons who had information on the subject.

Added to this need for knowledge was the fact that very little spraying equipment was available, the demand was great, and prospects were dim for immediate relief from the mechanical bottleneck. Added up, the over-all situation presented us with a real opportunity. We initiated in our community a custom spraying service, offering the use not only of good equipment, but of manpower trained in the use of such products.

As a result of successful operations in our trading area, requests for fly control service have reached the point where it has been necessary for us to sublet much of this work to a local whitewashing contractor. This subcontractor has been fully trained by our men and has been taken through the laboratories which manufacture the products used in the operations. This arrangement has worked out satisfactorily, and helps us keep up with demand which at times overtaxes our own equipment.

The matter of price is always of prime interest both to the customer and to others interested in doing custom spray work. Our experience has shown that the establishment of a proper price need not be difficult. The customer pays for the material he uses, plus the same labor charge we make for tractor and implement work, plus a small charge per job for the use of the spraying equipment. The latter cost on every job is less than the price of a small hand sprayer which would be used by the customer if he were to undertake the job himself.

So far, we have mentioned only the spraying of DDT and insect control on farms. But that is not the entire scope of the work done by custom sprayers. Our service has been expanded to include application of 2,4-D weed control activities in the area. This market has also been very active, with a demand for treatment of lawns, fence rows and other weedy areas. The attractiveness of this service to the customer lies largely in the combination of having an excellent product, having it applied by men who have been well trained in the application of such sprays, and offering the service at a cost considered reasonable by growers. As a rule the cost of labor and equipment comes to less than the price of hand equipment.

Looking into the future, it appears that the demand for custom spraying is likely to increase, since on most of the work already done repeat orders will follow later, and as the idea becomes more generally accepted, new customers will be available. At the same time, however, many present users of custom spraying service may eventually buy their own equipment and apply insecticides and weed killers to greater areas than were covered in custom work during the past season.

New chemicals for agriculture promise increased efficiency and better living for the American agriculturist. It is the hope of the custom sprayer to help bring these promises into reality.★★

Orchards, agricultural fields, public parks and playgrounds are all included in the realm of custom-spraying. Photos below illustrate typical scenes of custom-spray activity. (Photos courtesy of H. D. Hudson Mfg. Company, Chicago.)

By William B. Parker
California Spray Chemical Corporation

THERE have been many improvements made in recent years in the application of spray materials, some of which are developments of a process which the author invented at Fresno, California in 1931, during a campaign against the grape leaf hopper by the California Spray Chemical Corporation. This process, which is known as the Vapo-Dust or Fog Spray method, uses certain types of spray oils, alone or containing concentrated spray materials and even water as an invert emulsion. These combinations are atomized and diluted with air to form a fog that envelops pest-infested plants or trees in such a manner as rapidly, completely, and economically to cover them with a thin uniform film of very active material.

The grape leaf hopper adult is difficult to wet with water sprays, but since it was found that these pests could be killed easily with a light phytonomic oil containing pyrethrum extract, it became necessary to find a more practical means of applying a pure oil spray that would be safer than the methods then in use. The "Vapo-Duster" was therefore developed to atomize the concentrated oil pyrethrum mixture into an enveloping fog that could be applied safely to crops.

The first machine was a crude affair. It consisted of a power sulfur duster, an old spray pump, and an oil burner spray nozzle set in the end of the blower nozzle. From this first machine have come many types of atomizing attachments adaptable to large capacity blowers and to airplanes.

Some of the machines that are a direct result of these experiments are the Bean Mist Duster, the Niagara Liqui-Duster with special nozzle and the Buffalo Turbine Blower for use on trees or vines, and the Naconizer and similar atomizing machines for use against pests on field and truck crops. The Tifa and Beskil machines are new developments but are also designed to use concentrated materials.

With the development of adequate machinery, it has been possible to apply most of our spray materials in concentrated form by the Vapo-Dust or Fog Spray method. Oil soluble materials such as nicotine, pyrethrum, and DDT have been dissolved in the "Vaporol" which is an oil blend containing an emulsifier. Arsenate of lead, zinc "Coposil," and other powders have been suspended in the "Vaprol," and lime sulphur solution has been used in the invert emulsion. The invert emulsion is produced by emulsifying water or aqueous solutions in the "Vaporol."

Water is sometimes used merely to bulk the material so that a minimum of oil need be applied and yet enough spray put on (15-30 gallons per acre of trees) to give complete coverage.

We have used oil in our work in California because we have found that if water is atomized as finely as is required, much of it evaporates be-

(*Turn to Page* 51)

The Bean Mist Duster applying winter "Vaporol," "Zinc Coposil," and basic lead arsenate to apricot trees for brown rot, twig borer and brown apricot scale in the Santa Clara Valley, State of California.

EMULPHOR DDT

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Experiment Station Digest

By H. H. Slawson

NEW insecticides now being perfected offer apple growers better control of their most serious pest, the codling moth, Dr. L. Haseman, chairman of the entomology section of the Missouri Agricultural Experiment station, Columbia, Mo., asserts in the station's latest annual report.

Work at the Missouri station during the year was directed largely toward finding safeners which would prevent foliage buring. All safeners used with lead arsenic somewhat reduced the insecticidal value, the investigation showed. Greatest reduction followed with materials which gave the most protection to the foliage.

Both the 1-1-100 zinc lime and 1/2-1-100 bordeaux greatly reduced arsenical injury to foliage, Dr. Haseman states. He reports on results from various spray schedules and declares that none of the dormant applications for killing over wintering codling moth larvae gave satisfactory results.

Considerable attention was given at the Missouri station to ticks, which are said to be the most troublesome external parasites of livestock and wild life in the wooded parts of the Ozarks. Engorged ticks, it was found, were only slightly susceptible to action of insecticides. None of those tested, when applied by hand as dust or liquid at recommended dilutions, gave kills of ticks under twelve hours and none was considered entirely satisfactory.

Materials tested included pyrethrum, derris, pine tar, creosote, nicotine sulfate and four commercial products. Ticks actually hit by the spray were killed when a lawn was treated with nicotine sulfate in various dilutions, but ticks hidden under litter were unaffected. Other compounds reacted in like manner, Dinitro phenol or derris with dusting sulfur dusted on cow paths, killed ticks contacted but did not clean up infestations.

Florida investigation of the new insecticide, sabadilla, for control of bean leafhopper demonstrated that it has good knock-down qualities, although its residual value did not compare with that of DDT. As a non-poisonous insecticide, sabadilla was rated as superior to available pyrethrum mari and, when used at 10 per cent strength of the finely ground sabadilla seed, with sulfur in dust form, "may compare favorably to pre-war pyrethrum flowers and extracts," says the report.

At the Everglades sub-experiment station where the sabadilla was tested, DDT was also used against bean leafhopper and found to be superior to any other material used. Dusts containing 1½ to 3 per cent DDT with sulfur were used, also sprays containing 0.8 to 1.6 lbs. DDT per 100 gallons of water with sulfur. These gave excellent control and the report adds that "There is evidence that even weaker dilutions may prove satisfactory in commercial practice."

Work done at the Gainesville, Fla., station on use of DDT for control of insect and arachnid pests of cattle determined that dilute concentrations of DDT suspended in suitable dispersing agents are highly efficient in controlling hornflies. Cattle treated by both dip and spray methods were kept practically free of hornflies for two weeks but the spray method was declared preferable, due to its high degree of effectiveness and lower cost.

DDT proved highly efficient in controlling Colorado beetles but gave poor results on Mexican bettles at the Florida station. It was better than any other insecticide tried for melon worms and pickle worms on squash, cucumbers and cantaloupes, but squash bugs were very resistant to the compound. It also gave promise of being the best control yet tried for chinch bug in St. Augustine grasses and it was found by the Floridians to be "very effective" against cockroaches, flies, mosquitoes and ants in buildings. Sprinkled on ant nests out of doors, it was effective there, too.

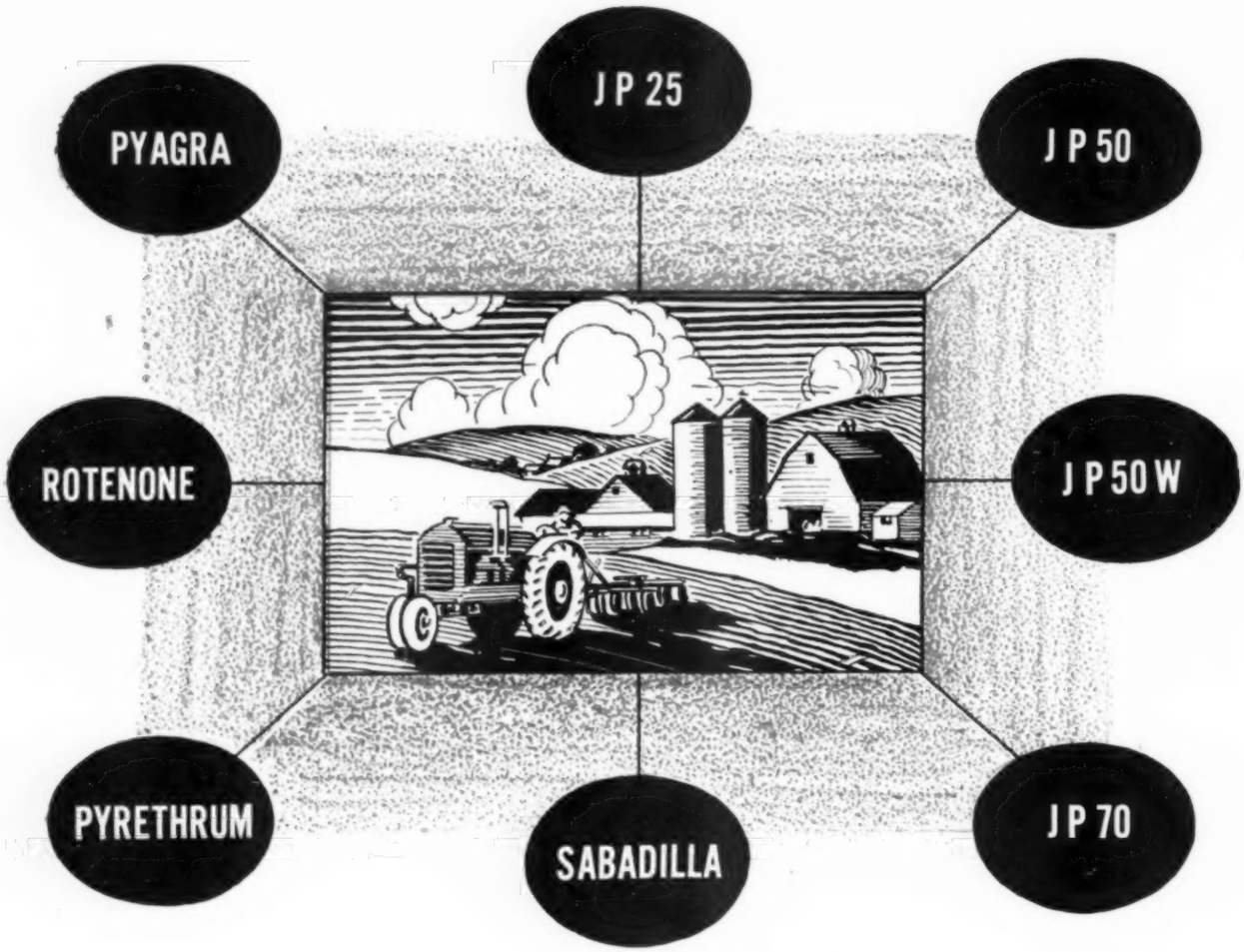
Prominent DDT Role

RESULTS are reported on the Florida station's use of DDT against cabbage insects, leafhopper on black-eyed peas, pepper weevil, bean leafroller, papaya webworm, various potato pests, corn earworm, the mole cricket, stable flies, onion thrips, pecan nut casebearer, orange scale and other pests of Florida agriculture. Summarizing, the report remarks that "It is apparent that much work with DDT must be done on each type of insect."

Florida station, during the year, issued a bulletin, No. 411, on "Insects and Diseases of the Pecan in Florida," which lists best known control methods, suggests combination sprays for insect and disease control, gives hints on insecticides and fungicides, the spray outfit, application of spray materials, and warns on use and storage of poisons.

Louisiana station's earlier studies had definitely established that practical control of sugar cane borer could be achieved by dusting with cryolite. However, lethal effects of the cryolite on natural predators of sugar cane aphid, caused tremendous build-up of the aphid population. This posed the problem of finding an aphicide which could be added to the cryolite, and involved determination of the minimum strength of the aphicide, number of applications necessary for effective control and the effects on valuable parasites of the borer.

Various forms of nicotine at one and two per cent strength, tried with cryolite in hand-gun and plane tests were ineffective and, while 3 per



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JP 50—A 50% DDT dust concentrate; small particle size, conditioned. *Uses:* Agricultural dusts.

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JP 70—A water-emulsifiable concentrate containing 70% of DDT isomers. *Uses:* Especially adapted for potato insects.

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cent strength reduced the aphid population to some extent, it was too expensive for practical commercial purposes. Sulfur was found the most effective material for preventing aphid build-up, but its use was limited because of its toxic effect on the *Tricogramma* parasite of the borer. None of the nicotine tests affected this parasite.

Louisiana cotton growers have also been confronted with a similar problem of checking the aphid build-up which follows use of calcium arsenate for boll weevil control. Past experiments had shown that nicotine, added to the calcium arsenate, will check the aphids but not affect the poison controlling the boll weevil. Growers, however, have been reluctant to accept and utilize nicotine with the calcium arsenate for several reasons.

The Baton Rouge investigators therefore concentrated on means for simplifying and improving mixing and handling methods, to reduce the objectionable nature of the nicotine-calcium arsenate combination and report "considerable progress." Further experimentation, however, was recognized as necessary to clarify the problem of cotton aphid control.

Other sections of the Louisiana report deal with control of tomato fruit worm, melon aphid and pickleworm, and wireworms and velvet bean caterpillars on soybeans and peanuts. Brief progress reports are submitted on tests of DDT with a dozen field and household insect pests and on control of plant diseases by treating seeds of rice, oats, peanuts and sweet corn with fungicides.

Oklahoma station reports the discovery that "cat willow," a common wild shrub, contains a previously unknown substance, tentatively called "Amorpha," which is poisonous or repellant to insects. Sprays and dusts of Amorpha killed a few species of bugs, beetles and plant lice, but were only slightly poisonous to others among 29 species tested. Tests indicate, says the report "that it may be highly repellent to at least some of the insects and that its repellency lasts over a longer period of time than most substances now used for that purpose."

Also developed at the Oklahoma station's new insecticide laboratory was a fly spray formula which, the report asserts, "was equal or superior to a number of sprays now on the market." Another major accomplishment of the year was development of control methods for the pecan nut casebearer which in the previous year had destroyed from one-half to three-fourths of the Oklahoma pecan crop.

DDT was used for control of codling moth in the Oklahoma station orchards in 1945 and found more effective than arsenate of lead. A rather severe infestation of red spiders followed, however, paralleling experiences reported by other stations and the report warns that if DN-111 is used to control the red spider, it may damage foliage.

A special Oklahoma bulletin, issued early this spring, commends the use of sabadilla dust which at 10 per cent strength gave complete control of squash bug on squash, pumpkin and cantaloupe. It also protected sweet corn from chinch bugs when dusted at the base of plants where the bugs were concentrated. Sabadilla, the farmers were informed, "will be on the market this season under various trade names or can be bought in concentrated form and diluted with talc, pyrophyllite or lime."

Fog Generator Used

ARIZONA Experiment station, during the past year, released a lengthy report on experimental use of a navy fog generator for applying DDT to crop plants and livestock. Results, though not final, are characterized in the narrative record of the tests as "significant and highly promising." Confidence is expressed that further experimentation with the fog generator "will result in perfecting a revolutionary addition to our already extensive armament for fighting man's insect enemies."

Delaware Experiment Station at Newark lists among outstanding developments in 1945 the use of new organic fungicides for control of vegetable diseases. Two compounds, disodium ethylene bisdithiocarbamate with added zinc sulfate and lime, and zinc dimethyl dithiocarbamate, were commended as having high insecticidal value and ability to combine effectively with DDT.

Medication of soil near growing plants with the first of these two compounds, says the report, was effective against Mexican bean beetle. "Never before," adds the report, "has medication been found of value in control of insects. The importance of medication and fertilization as one operation is obvious."

Investigating the reasons why thirty-six carloads of Delaware apples had been rejected at terminal markets, it was learned that they had been shipped from the Japanese beetle quarantine area and had been fumigated with methyl bromide so they could be certified as "beetle free."

Tests by the station authorities proved that the fumigant had caused surface scald and internal breakdown which rendered the apples undesirable for marketing. On one variety, the Williams apple, as much as 98 per cent injury was caused, while other varieties suffered no injury. Peaches, when fumigated, showed no injury but ripened more rapidly and developed an off flavor.

Delaware station's report also discusses use of "Elgatol" for thinning apples and peaches; chemical treatment of sweet potato root sprouts to control wilt; effects of new fungicide combinations in control of early blight disease in potatoes and other problems involving use of agricultural chemicals.

Delaware's Naval Stores Research Fellowship, supported by the Hercules Powder Co., Wilmington, Del., evaluated between 100 and 150 products during the year, using the hornfly, German cockroach, yellow fever mosquito and certain insects which attack farm crops. Several "extremely interesting" leads were uncovered, the report states. This Fellowship project has been active since Feb. 19, 1934.

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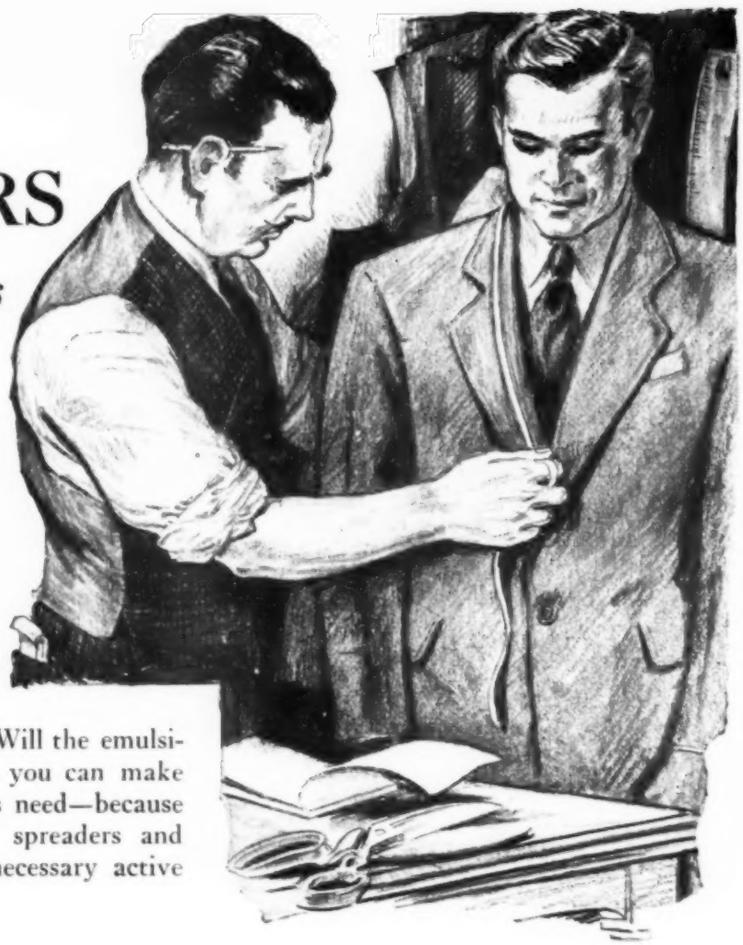

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Nebraska entomologists who were testing DDT for control of potato flea beetles report an unusual result in fields at the Scottsbluff substation. One dust of 3 per cent DDT in pyrophyllite and a one per cent DDT-fused sulfur dust gave almost 100 per cent kill, as measured by sweeping the plots 24 hours following the application. Continuing, the report says "The one per cent DDT-fused sulfur dust remained significantly more effective over a period of several days and continued to kill many newly developed beetles as they emerged from the soil."

In another test at Scottsbluff DDT-pyrophyllite dust mixtures were applied by hand to the soil one or two inches above the potato seed piece at time of planting. Dusts of 3, 6 and 10 per cent DDT were used at the uniform rate of 300 lbs. of the mixed dust per acre. All treatments significantly reduced larval damage to the tubers and it was concluded that with different DDT formulations and better methods of application results of value might be produced. No injury to plants was observed.

Tests of the effectiveness of sabadilla powder against chinch bugs in comparison with other insecticides led to the assertion in the Nebraska report, that sabadilla was superior to either dinitro dusts or DDT sprays and dusts where it was applied directly to bugs on growing plants. All bugs wet with the sabadilla spray were dead in about one hour but considerable numbers, protected by leaf sheaths or under clods or in cracks in the soil, survived. Even where large numbers of bugs are present on plants, it was concluded, they can be reduced to such an extent as to save the plants.

Two Nebraska poultry houses heavily infested with bed bugs—60 to 75 bugs per linear foot in cracks—were sprayed with a 5 per cent DDT emulsion and three subsequent examinations failed to reveal any live bugs. This particular infestation, it was stated, had persisted for more than ten years, in spite of various treatments. Reports are also made on use of DDT for control of flies in dairy and beef cattle barns, a brood sow shed and a creamery at the Nebraska station.

Studying the problem of making codling moth sprays more effective, Indiana station researchers decided that a little lamp black could help. This, it was explained, was added "to particularly mask the visible residue produced by use of several sprays of flocculated bentonite. It was thought that this would have less effect on the total photosynthesis, as it was evident from the past two years' work that there was much more reflected light under the near trees receiving these sprays than on other combinations."

S. Carolina Reports

THE fifty-eighth annual report of the South Carolina experiment station, Clemson college, Clemson, S. C. contains some interesting reports on pest control, and findings regarding fertilization of soil, in that section of the country.

Results of tests for the control of pests (rice weevil and associated insects) of stored corn and cowpeas are recorded as follows: Using 3 per cent DDT dust, damage to stored corn was listed as from zero to slight, with no live weevils found. With .5 per cent rotenone, damage is listed as "severe, about half of corn destroyed." The same report was given for rotenone in a 4.4 per cent concentration. Apparently neither application of rotenone was effective.

For cowpeas, the same results of "No damage, no weevils dead or alive" were tabulated for all three insecticidal applications, all three treatments apparently being effective. In a control storage bin where no insecticides were applied, the peas were completely riddled by weevils, according to the report.

In experiments against the cowpea curculio, three insecticides were used. They were DDT-oil dust, containing 1 per cent petroleum oil; 5 per cent DDT dust, and sabadilla. Dust applications were made in early morning at intervals of 4 or 5 days beginning just as the pods began to form and ending when all pods had been picked, the report explains. Final tabulations show sabadilla giving better control than either of the other treatments.

Cotton insect investigations are reported as having been carried out in cooperation with the U.S.D.A. Bureau of Entomology and Plant Quarantine to test the effectiveness of various insecticides and combinations for control of boll weevil and the cotton aphid. In the same category, studies were made to determine the effects on the boll weevil of temperature, humidity, rainfall, cultural practices, and the destruction of cotton stalks early in the fall. Likewise, further experiments were undertaken to determine the effect on plant growth of insecticides applied to the soil in varying amounts and to discover means of preventing injury to plants grown on such soils by the insecticides used.

Since 1927 it has been known that on light, sandy soils of South Carolina, the germination and growth of certain crops are adversely affected where heavy dosages of calcium arsenate have been applied to previously grown cotton over a period of years. The extent to which other insecticides might cause similar injury was unknown. In 1944 studies were undertaken to obtain information on this point and to find a preventive for the injury caused by calcium arsenate. This work is still in the preliminary stage.

Of the insecticides added to the soil of small plots at rates of 50 to 500 pounds per acre to determine the comparative injury, paris green was found to cause the greatest injury, followed by calcium arsenate, lead arsenate, basic copper arsenate, and magnesium arsenate, in the order given. Combinations of some of these materials caused injury in direct ratio to that caused by the separate insecticides.

The annual report is published in a 166-page booklet which includes many phases of agricultural experimentation in addition to pest control. The South Carolina experiment station is under the direction of Dr. H. P. Cooper.★★

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PENCO CALCIUM ARSENATE—for economical, effective control of the cotton boll weevil, cotton leaf worm, cotton boll worm. Sulphur and Paris Green mixtures also available.

PENCO GRAIN FUMIGANT—for protection of stored grain. Will not harm the germination or milling qualities of the grain, does not create a fire or explosion hazard.

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The Listening Post

This department, which reviews current plant disease and insect control problems, is a monthly feature of AGRICULTURAL CHEMICALS. The following comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey. The following summary of their most recent reports was prepared especially for this magazine.

By Paul R. Miller

REPORTS that late blight (*Phytophthora infestans*) was appearing to an alarming extent were received from commercial tomato-growing areas. With the aim of presenting a systematic and timely account of the developments of the disease this year on its two important hosts, the Survey asked its collaborators to send reports of its incidence on either or both potato and tomato, especially as to the following points:

1. **Has the disease occurred on either host and to what extent?**
2. **What control measures, if any, have been taken?**
3. **When was the disease first noted and what in your opinion was the original source of infection?**

A summary of the answers gives a rather complete story of the occurrence of the disease to about the middle of June of this year.

Some factors brought out in the reports may be briefly indicated. Weather has been unusually favorable for late blight development over a long period of time and over a widespread area. The disease is reported as appearing much earlier in several states this year than previously. Infected southern-grown plants were reported as the source of disease in several tomato-growing states.

In Louisiana, late blight was first observed on potatoes in early April and was rather general by the end of the season. Little damage was done to early planted potatoes but a considerable amount occurred on the later crop. On tomatoes, both fruits and leaves were generally infected but the damage was not great. Some spraying with "Dithane" and some dusting was done to control the disease. Late blight occurred on potatoes and tomatoes early in the season in Mississippi and caused some damage to garden crop potatoes in the southern part of the State in May. Very few control measures for blight are being practiced in this State.

The first report of late blight in Alabama was on March 25 when blighted potatoes were found in the southern part of the State. The disease spread slowly and did not reach epidemic proportions until the last two weeks of May. By this time most of the potatoes had been harvested but the commercial plantings of early tomatoes were just reaching maturity. Tomatoes in home gardens, as well as commercial plants, were heavily damaged throughout the southern half of Alabama. Weather played an important part in the epidemic that swept through the State. Most Alabama potato growers, realizing the danger of late blight from previous experiences, started dusting or spraying during the latter part of March. Very few were equipped to spray properly and most of the growers carried out the dusting program utilizing one of the copper dusts. Almost all of those who sprayed used "Dithane." Some dusting was done by airplanes.

In Tennessee late blight on tomatoes was widespread and damage was severe. Control measures were nil because spraying for tomatoes has not been demonstrated conclusively as profitable there. In Georgia the disease appeared early and did considerable damage throughout the State. It was reported as occurring in the Piedmont section on tomatoes for the first time in thirty years. Tomato late blight was very serious in all of South Carolina's commercial

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Insect Conditions During Early July

By G. J. Haeussler

This column is prepared especially for readers of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U.S.D.A. His observations, based on latest reports received by the Bureau from collaborators all over the country, will be a monthly feature of AGRICULTURE CHEMICALS.

WEATHER conditions continued favorable for boll weevils during the first half of August in at least 7 of the 9 leading cotton-growing States and the weevil situation has continued critical in all States. Most of the cotton in the southern half of the Cotton Belt and in the Carolinas had passed the peak of fruiting early in August and the weevil damage had become more serious to bolls than to squares. Dusting with calcium arsenate continued essential to protect the late crop of bolls.

Considerable spread of the cotton leafworm has occurred. By August 10, this insect was abundant and causing serious damage over large areas of Texas, Oklahoma, Arkansas, Louisiana, and Mississippi. The insect also reached Alabama. New Mexico and Arizona and had been found in Butler County in southeastern Missouri.

The bollworm is showing up as a more serious pest of cotton than during any recent year. The most serious damage has been reported from central Texas, but it is also serious in Louisiana and Arizona. Damage has been spotted in Oklahoma and Mississippi. Applications of DDT dust are being made in some infested areas.

(*Turn to Page* 58)

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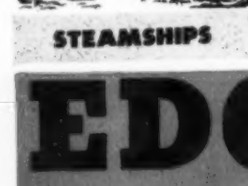

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Comments....

By Dr. Alvin J. Cox

This column by Dr. Cox will appear from time to time as a feature of AGRICULTURAL CHEMICALS. Dr. Cox formerly was successively Physical Chemist, Chief Chemist, Assistant Director, and Director of the Bureau of Science, Government of the Philippines. He was appointed Chief of the Bureau of Chemistry, California State Dept. of Agriculture in 1932 and retired in 1945.

IN writing the article "Problems of Crop Nutrition" for the June, 1946 issue of *Agricultural Chemicals*, my subject dwelt almost entirely upon scientific matters at hand rather than going into various peculiar practices found in agricultural procedure around the country. For instance, nothing was said about widespread superstition and "trust to luck" methods, both of which are more deeply entrenched in farming than is ordinarily supposed.

When but a child I asked my father if finding a horseshoe in the road was a sign of good luck as the other rural children believed. He said that in general every person is his own luck, and told me about the success of a boy who grew an excellent vegetable garden by good agricultural practice against the advice of his ignorant neighbors.

One would expect the superstitious age to be past, but if one thinks about it he will notice that in their everyday conversation many persons still cling to many of the old sayings and repeat them with astonishing emphasis. Children accept them as they would anything else told them, and uneducated persons continue to abide by them.

Of course some of the old sayings have scientific foundations as, for example, the Filipino woman who told me in Manila that the grapefruit on my tree was sour because it had not had a dead dog buried by its roots. We highly prize organic nitrogen from any source whatsoever. We may have learned the fertilizing value of fish meal from the Indians' custom of planting fish in their hills of maize.

"Signs" are not credited so generally as in former years, but I am amazed at the survivals. Farmers have always had the reputation of depending upon signs, many of which relate to the moon. The moon is still seriously given credit for many effects on agricultural crops and farm operations, and many people still believe in "the dark of the moon" for vegetables. When a boy, I once asked a French farmer for the best sign to undertake a certain farm procedure and received the reply, "The best sign is when you get ready." I have had farm hands who believed that the light of the moon would spoil fish and give a bad headache to anyone who slept with its light shining upon him. It is only to the eye that the changes in the moon appear, for the moon revolves about the earth each day. Unfortunately the sign of the moon has been used as a virtual oracle on farming, gardening, fishing, and even personal affairs.

Any advantage of planting corn, potatoes or other crop only "in the old of the moon," avoiding planting any seeds "in the new of the moon," or other "moon sign" for transplanting, pruning, destroying weeds, cutting timber, castrating animals, and other farm procedures has been disproven by years of experimentation. With regard to crops and other farm operations it would be important to know the coming rainfall, temperatures, humidities, insect populations and other factors which do influence crops, an abnormality in any one of which may reduce yield or produce other undesirable effects. Unfortunately, we cannot foretell these changes.

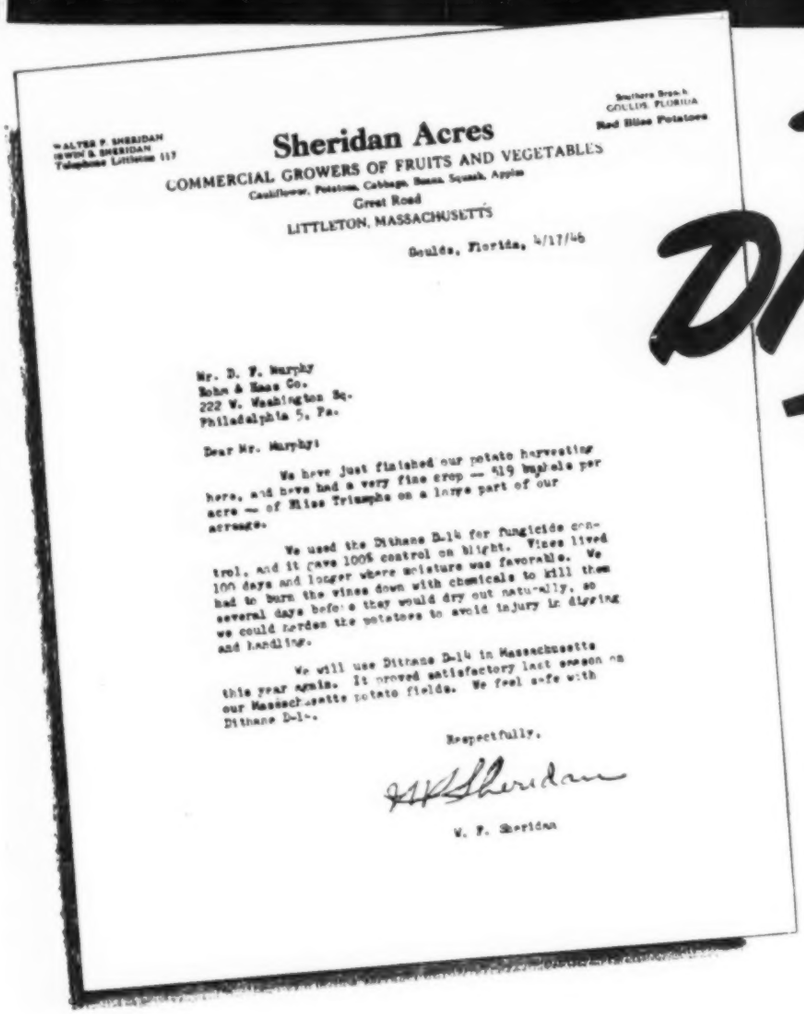
Great progress has been made in understanding the processes of plant growth but it is difficult to overcome superstition. If one pauses to think, he will know that if one planted "by the moon" in Florida, Texas, and California, the plants would not all grow the same. No one can analyze the soil and tell what the weather conditions will be three months hence. Weather conditions during a growing period may change available supply of plant food quite materially. A circle around the moon as a "sign" or indication of approaching storm is not without merit for there would be no circle except for the high moisture content of the air. These considerations should dissipate superstitions.

The Ifugaos, a race of the Philippine Islands, have their harvest ceremonials at which time they call upon the deities to increase the rice in the granary. The response is believed unfailing if the farmer has sufficient trust. However, if the farmer shows his distrust by counting the sheaves in advance of the ceremony the superstitious natives believe the spirits will do nothing for him.

At one time there were great misrepresentations as to the efficacy of gypsum and of calcium carbonate. Formerly vast quantities were dis-

(*Turn to Page* 58)

Among Florida potato growers



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IRWIN A. SHERIDAN
Telephone Littleton 117

Sheridan Acres

COMMERCIAL GROWERS OF FRUITS AND VEGETABLES
Cauliflower, Potatoes, Cabbage, Beans, Squash, Apples
Great Road
LITTLETON, MASSACHUSETTS

Southern Branch
GOULDS, FLORIDA
Red Bliss Potatoes

Goulds, Florida, 4/17/46

Mr. D. F. Murphy
Rohm & Haas Co.
222 W. Washington Sq.
Philadelphia 5, Pa.

Dear Mr. Murphy:

We have just finished our potato harvesting here, and have had a very fine crop — 419 bushels per acre — of Bliss Triumphs on a large part of our acreage.

We used the Dithane D-14 for fungicide control, and it gave 100% control on blight. Vines lived 100 days and longer where moisture was favorable. We had to burn the vines down with chemicals to kill them several days before they would dry out naturally, so we could harden the potatoes to avoid injury in digging and handling.

We will use Dithane D-14 in Massachusetts this year again. It proved satisfactory last season on our Massachusetts potato fields. We feel safe with Dithane D-14.

Respectfully,

W. F. Sheridan

—it's DITHANE

Many Florida growers have similarly praised DITHANE. For in 1945 and 1946, DITHANE produced average yields in the Homestead area of 300 bushels per acre. (Previous to 1945, a 12 year average for copper fungicides in the same area was only 125 bushels per acre.)

This year, in Florida's Homestead area, DITHANE was used on 95% of the potato acreage *without a failure* in spite of one of the worst late blight years ever experienced.

Only DITHANE stops late blight in its tracks and controls early blight as well.

REMEMBER—

DITHANE effectively controls both early *and* late blight.

DITHANE is highly compatible with DDT, and the combination is outstanding for complete control of disease and insects.

DITHANE plus DDT is easy to use—will not clog spray nozzles.

in 1946, it will be DITHANE plus DDT

For higher yields, we recommend this program of complete blight and insect control. The 1945 results in every major potato-growing area definitely prove the outstanding effectiveness of this DITHANE-DDT combination.

DITHANE *is a trade-mark, Reg. U. S. Pat. Off.*

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Manufacturers of Chemicals including Synthetic Insecticides . . . Fungicides . . . Plastics . . . Enzymes . . . Chemicals for the Leather, Textile and other Industries

TECHNICAL Briefs

Recent Technical Developments in the Agricultural Chemical Field

DDT on Tomato Worms

Field experiments in Southern California with DDT against insects affecting tomatoes in that region are reported in a recent U.S.D.A. bulletin by Joseph Wilcox and A. F. Howland of the Division of Truck Crop and Garden Insect Investigations. The most important insects preying on tomato plants in southern California are the tomato fruitworm, the tomato russet mite, the tomato hornworm, the tobacco hornworm, and a number of varieties of cutworms, the report states.

The experiments revealed that dust mixtures containing 2.5 or 5 per cent of DDT gave about 80 per cent control of the tomato fruitworm; a control superior to previously recommended cryolite dust mixtures containing some 70 per cent of sodium fluoaluminate, and undiluted calcium arsenate.

Dust mixtures containing 10 per cent of DDT resulted in approximately 94 per cent control of the tomato fruitworm, and these mixtures were statistically superior to the weaker dilutions. DDT dust in 10 per cent strength gave better control against other caterpillars attacking tomatoes during the fruiting stage, such as the tobacco hornworm, the tomato hornworm, the beet armyworm, and several species of cutworms, than was obtained with weaker dilutions of DDT with 70 per cent cryolite dusts. Undiluted calcium arsenate was superior to 10 per cent DDT in the control of hornworms. DDT dust mixtures were not effective against the tomato russet mite unless 25 per cent of sulfur was included as a diluent. Tests during 1945 indicated that dust mixtures containing 20 per cent of DDT were not sufficiently superior to the 10 per cent strength to warrant the additional expense involved.

•

Tree Dressing Booklet

D. S. Welch and L. H. MacDaniels of Cornell University Agricultural Experiment Station, Ithaca, N. Y. are authors of Bulletin 821, "Apple Tree Pruning Wounds," dealing with treatment and healing in sound and winter-injured trees.* The subject matter covers a wide range of problems connected with wood decay, and sets forth the requirements of a satisfactory tree-wound dressing to protect and heal the spot where the outer-bark has been removed.

The authors describe weathering tests for durability of materials, toxicity tests, and present charts showing the results of such experiments. Numerous photographs are shown of wood having been exposed to weather conditions for long periods of time with various types of dressing on wounds caused by winter or pruning. Reports of tests in different orchards in New York State are given, showing the manner in which trees of different type, old and young, responded to wound treatments.

In conclusion, the authors state that the results of these studies do not point to any one material as being entirely suitable for treating pruning wounds on trees. From the standpoint of durability and freedom from injury to the cambium, asphalt-water emulsion, white house paint, fibrated asphalt paint, Bordeaux paint, and copper resin have considerable promise, they say. Yet to be determined is the effect of these and other materials on the organisms that decay the tissues of pruning wounds.

*See also "Tree Wound Dressings" by Milton A. Lesser, *Agricultural Chemicals* for August, 1946, page 26.

•

Sabadilla for Squash Bugs

Control of squash bug through use of 10 per cent sabadilla dust is reported by the Extension Service of the Vermont State Agricultural College. In reporting this activity through the *Green Mountain Gardener*, the college describes the habits of squash bugs which survive the winter months under the shelter of dead vines or leaves, outbuildings or dwellings, and appear in the garden about the time the vines begin to run. Incubation period is about 10 days, it says, after which time the nymphs appear. The pamphlet tells its readers that sabadilla should be ready for public consumption on an even large scale by next growing season.

•

Kansas Insect Control

A booklet, "Livestock Insect Control in Kansas" has been prepared by Kansas State College Extension Service, Manhattan, Kans. Written by Dr. E. G. Kelly, Extension Entomologist, it presents information regarding insects and parasites which prey on cattle, and describes various methods of control used. Cattle lice control is described in detail, with dipping or spraying with an "approved" insecticide recommended over dusting operations. "Animals infested with cattle lice must be thoroughly treated from the face to the tip of the tail and down to the hoof. The backs should be drenched. There is no better way to do this than dipping or spraying with 7½ pounds of cube to 100 gallons of water by a power sprayer," it says.

Winter treatment for cattle grubs with rotenone spray will destroy the lice if all parts of the animals are treated, it says, but adds that such treatments must be repeated in 15 days. These treatments kill all lice, but the procedure will not kill lice eggs, it states. Numerous photographs

Good News

for

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Attention Distributors

•

We now offer in carload quantities our ZINC COMPOUND 38% Zn for use in Agricultural Zinc Sprays and in nutritional Zinc applications. This product is composed of various Zinc components blended to give a uniform non-hardening product which is easier to handle than some Zinc materials. It has been tested and is used in Florida to correct Zinc deficiency. Many carloads have been used for this purpose with complete satisfaction.

Used with complete satisfaction in Georgia and South Carolina in formulas containing Arsenate of Lead. If you sell Zinc for Agricultural applications write for details and samples.

Prompt carload shipments

•

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CYTOX* DDT PRODUCTS

THE 1946 season has proven the quality of CYTOX 50% DDT WETTABLE POWDER and CYTOX 50% DDT DUST CONCENTRATE.

The formulation of both products was perfected only after months of intensive painstaking research.

They are ground to an average particle size of 5 microns in order to expose the greatest possible surface of DDT to assure best control of insects.

A combination of inert ingredients — most compatible with DDT — was chosen after tests showed that no single inert material would prove as satisfactory.

CYTOX 50% DDT WETTABLE POWDER contains just enough wetting agent to give good wettability and at the same time keep foaming to a minimum and prevent excessive run-off of the spray. In addition, a dispersing agent is included to aid in keeping the DDT in suspension.

CYTOX 50% DDT DUST CONCENTRATE (micron-sized) is formulated with the same care. It may be diluted with talcs and clays for a dust of the desired DDT strength for the control of a variety of insects affecting agricultural crops, humans, and animals.

Comparative tests have proven the superiority of CYTOX 50% DDT WETTABLE POWDER and CYTOX 50% DDT DUST CONCENTRATE.

Call on us regarding your DDT requirements. Write or wire for full information.

•

AMERICAN CYANAMID COMPANY

Insecticide Department

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*Trade-mark

accompany the description of dipping, spraying and equipment used for this purposes.

The brochure tells about the cattle grub program in Kansas, and how the State Legislature in 1943 granted an appropriation for control of cattle grubs and nodular worms in sheep. It traces the subsequent development of the program, bringing it up to May of this year at which time a total of 140 power-driven spraying machines were being used in the statewide program. Some 460,000 head of cattle were treated in the 1944-45 season, the folder says.

•

Rotenone-Bearing Dusts

Recent experiments in New Zealand have been made to determine whether percentage of rotenone or ether extract content would indicate the insecticidal value of rotenone-bearing dusts, it is reported by W. Cottier and H. Jacks in the *New Zealand Journal of Science and Technology, 28A*, 244-9. In carrying out the experiments, three samples of derris root containing 2.7-3.4 per cent of rotenone, and 13.6-18.6 per cent of ether extract, and 1 sample of cube containing 3.5 per cent and 20.5 per cent respectively, were used. When these samples were diluted with a kaolin or siliceous earth filler to give dusts with 0.25-1.0 per cent of rotenone, increasing the rotenone concentration gave increased effectiveness for dusts made with the same root sample. Dusts with the same rotenone concentration but from different root samples showed differences in performance which could not be explained by the percentage of ether extract. Active ingredients other than rotenone are probably responsible.

Application of 25 pounds of a dust containing a certain percentage of rotenone gave better results than 50 pounds of a dust containing half the percentage of rotenone. The probable explanation is that a greater quantity of the active part of the dust is brought into contact with the insect by application of a smaller amount of a more concentrated dust.

DDT for Lygus Bugs

Following experiments with three types of insecticidal dusts for control of *Lygus* spp. on seed alfalfa, only DDT showed definite promise of giving satisfactory results, according to a report by F. V. Lieberman and Q. A. Hare of the Division of Cereal and Forage Insect Investigations, U.S.D.A. The tests, made in Utah, used in addition to DDT, sabadilla and pyrethrum dusts for one season. The next year, emphasis was placed on DDT with the insecticide being distributed at dosages of 0.6, 1, and 2 pounds of DDT per acre applied as 20 pounds of mixed dust containing 3, 5, and 10 per cent of DDT in pyrophyllite.

"Control of *Lygus* was spectacular for 3 to 4 weeks" the report states. "Thereafter, noticeable numbers of nymphs hatching in the plots escaped the effect of the DDT, but the increase in number of bugs on the plants was not enough to warrant a second treatment. Nymphs on second-crop growth were tardy in hatching with respect to crop development, and most plots were dusted before many nymphs had appeared on the plants. More complete control might have been obtained if the dusts could have been applied nearer to large-scale hatching," the report continues.

Other tests in the vicinity tended to show the same superiority for DDT. Although the immediate kill of *Lygus* by sabadilla and pyrethrum-piperonyl cyclohexanone was "excellent," neither had noticeable residual effect, and the single applications failed to control the bugs, the report states.

•

Repellent Bulletin

The U.S. Department of Agriculture has issued a bulletin (E-698) written by E. V. Travis and F. A. Morton, on the "Use of Insect Repellents and Miticides." The paper includes data obtained in connection with investigations conducted under a transfer of funds, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and the Bureau of Entomology and Plant Quarantine. It gives formulations of chemicals of use in repelling mosquitoes, flies, biting gnats, chiggers, etc., and points out dangers to skin, clothing and other materials which come in contact with the respective formulations. Sources of materials are listed for both repellents and emulsifiers.

•

DDT-Fumigant Combination

Control of immature stages of Japanese beetle by use of fumigants applied as emulsions or solutions is reported by the U. S. Dept. of Agriculture, Research Administration, Bureau of Entomology and Plant Quarantine. The fumigants, including carbon disulfide, ethylene dichloride and mixtures of ethylene dibromide and ethylene dichloride, were effective against populations present in the soil at the time of application, but were considered by the investigators to be of no value in preventing reinfestation. However, tests carried out by combining fumigants with residual insecticides, such as DDT or lead arsenate have proved successful in doing an all-around job.

Such a combination was prepared to contain in proportions by weight, 17.5 per cent of ethylene dibromide, 62.5 per cent of ethylene dichloride, 17.5 per cent of DDT, and 2.5 per cent of "Tween 20" (polyoxyalkylene derivative of sorbitan monolaurate). Since the ingredients are soluble or miscible in these proportions, the mixture can be prepared by conventional methods. A similar mixture (except that half the ethylene dibromide was replaced with ethylene dichloride) was also diluted at the same rate.

Results were good following the spring application made when grubs were feeding near the surface. Five days after treatment with both mixtures, most of the collected specimens were dead. Final observations revealed that 98 to 100 per cent of the beetles were killed by the first mixture, and more than 95 per cent by the second.

These tests, and others, are not comprehensive enough to justify the establishment of recommendations for their use, according to the report. However, it adds, these preliminary

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FOOD MACHINERY CORPORATION
MIDDLEPORT, NEW YORK

BRANCH FACTORIES LOCATED AT STRATEGIC POINTS THROUGHOUT UNITED STATES AND CANADA

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Yes, TOBACCO BY-PRODUCTS is everlastingly at it — developing products of vital importance to agriculture.

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1. THE FAMOUS BLACK LEAF 40—Used as a spray or dust in controlling small insects and plant lice. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.

2. BLACK LEAF 155—for cover sprays for codling moth.

3. BLACK LEAF POWDER AND PELLETS — for controlling the large round worm in chickens.

PROTECTION For The Farmer

4. BLACK LEAF 155 WITH DDT—for control of codling moth and certain other insects.

5. BLACK LEAF 10 DUST BASE—meets the demand for a non-alkaline neutral dust.

6. BLACK LEAF CUNIC DRENCH—for sheep and goats. Formula recommended by U. S. Dept. of Agriculture.

7. BLACK LEAF DRY CONCENTRATE—used either as a spray or base mixture with carrier for dusting.

THE "TOBACCO BY-PRODUCTS" LINE ALSO INCLUDES

8. MASH-NICK — for mixing with poultry feed to control large round worm.

9. NICO-FUME LIQUID—for greenhouse work.

10. NICO-FUME PRESSURE FUMIGATOR—spreads fumes under pressure when ignited. Saves contact of hands with powder.

PROFITS For The Distributor

TOBACCO BY-PRODUCTS & CHEMICAL CORPORATION, INCORPORATED
LOUISVILLE, KENTUCKY

results are promising enough to suggest that such mixtures will be of value where immediate control of larvae is important. The cost of the fumigant required for the application of 25 pounds of ethylene dibromide per acre is about $20, it is stated. It also points out that the fumigant-DDT mixture may be unique in that the fumigant is both an active ingredient and a vehicle for DDT.

•

Bag Rot Halted

The British publication, *Manufacturing Chemist* in its June issue tells of a mildly alkaline humectant agent such as triethanolamine being used to prevent acid degradation of cotton threads such as used in shipping and storing fertilizer.

When investigating the failure of cotton thread in paper bags holding triple super-phosphate fertilizer, it was found that this amine prevented acid degradation of the thread in both laboratory trials and practical tests involving 80-day storage, it reports.

"The amine must be applied so that drying of the thread in bulk at temperatures approaching 212° F. is avoided, for this causes degradation of the thread. There is no difficulty with the drying of single strands at such temperatures. Alkaline sizing agents, soap of beeswax, or carbonates in the fertilizer to neutralize the acid, have little effect," it concludes.

•

Barley Pest Control

Barley crops in New Jersey have been damaged during the past season by army cutworm which cuts the barley stem below the head, causing complete loss of the grain. Control of this pest is achieved by spreading poison bait in the portion of the field being attacked. The bait consists of one pound of Paris Green or one pound of white arsenate mixed with 25 pounds of bran and two quarts of molasses. These materials should be diluted in two gallons of water, and if calcium arsenate is used, the bait should be prepared a day in advance. — Bulletin 727, June 1946, New Jersey Agricultural Experiment Station.

DDT Penetration

The question of whether or not DDT dissolved in kerosene might be more efficiently deposited on citrus trees if the kerosene were prevented from penetrating the bark and foliage has inspired experiments in use of these materials. The addition of 1 per cent or less of aluminum stearate to kerosene retards the rate of penetration of the kerosene into various parts of the tree. Mutual solvents such as tetralin and a commercial methyl naphthalene mixture also retarded the penetration of DDT, but their action is less marked than that of aluminum stearate. Mutual solvents with boiling points higher than kerosene tend to carry DDT into the tree to some extent. Extensive experiments are being made to determine what effect the retention of DDT on tree surfaces will have on the control of California red scale. W. Ebeling. *J. Econ. Entomol.* 38, 689-91.

•

Insecticidal Aerosols

R. Latta, in *J. Econ. Entomology.*, 38, 668-70, describes the use of insecticidal aerosols produced by means of low-boiling gases or by heat. With gas-generated aerosols too expensive for treatment of large areas, use of heat was investigated as the most promising alternate method of production. The method of generation does not affect the insecticidal efficiency of an aerosol so long as the ultimate toxic concentration is the same, since efficiency is a function of particle size.

A new generator of high efficiency has been made but is not yet ready for presentation. In use, the generator mounted on a truck is moved slowly across wind so that the aerosol will drift with a front approximately at right angles to the wind drift. In forests considerable wind above the trees is necessary to provide movement below the canopy. The rate of treatment is 30 seconds to 3 minutes per acre, depending on the size of generator and dosage. Present generators can produce aerosols containing up to 16 per cent of DDT in the original mixture at intake rates of 20-100 gals per generator per hour.

VAPO-DUST OR SPRAY

(*Continued from Page* 34)

fore reaching the trees. The oil being less volatile can be atomized more practically into fine particles that will stick when they reach the pests and plants. When the invert emulsion is atomized, the oil forms a film on the outside of each droplet and prevents the evaporation of the water.

Particle size is critical when using this method. Too large a particle blotches, and too small a particle will not adhere well to some surfaces. We have found that 75 to 300 microns is the best range of particle size, particularly when using the lower percentages of toxic materials.

Our Vapo-Dust programs include the use of both winter and summer "Vaporols." To these may be added: pyrethrum, nicatine, rotenone, DDT, lead arsenate, cryolite, "Zinc Coposil," dinitro cresol, the 2, 4 - Ds, the hormones and other spray materials.

Three to five gallons of "Vaporol" are applied per acre of grapes; and eight to thirty gallons per acre are usually used on trees, depending on their size and other factors.

Some of the advantages of the Vapo-Dust Method are; effective control of many pests with a small volume of spray, rapid application, and economy because of the minimum of labor required and the large acreage that can be protected with one machine. Double machines have treated up to one-hundred-and-twenty-five acres a day and airplanes can cover much more.

This method has progressed very satisfactorily on the west coast. Dr. S. F. Potts of the Bureau of Entomology and Plant Quarantine, U.S.D.A., and other workers are promoting a similar program in the east. Now that the equipment* is becoming increasingly available, and materials are being improved, its use will undoubtedly be extended rapidly in the field of pest control.

* Orville French ("Machinery for Application of Atomized Oil Sprays") *Agricultural Engineering*, September, 1934.

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Do real research. Take pains with processing. Package carefully. But the effectiveness of your product still depends on proper application. You can't afford to be "insecticide-wise and sprayer-foolish." Sales depend on proper application of your product.

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INDUSTRY NEWS

Westvaco Personnel

Westvaco Chlorine Products Corp. announces the appointment of Theodore Riedeburg as sales manager of its agricultural chemicals division. Before joining Westvaco earlier this year, Mr. Riedeburg was with the Dow Chemical Co. His new position includes sales supervision on all fumigants and insecticides manufactured by the company. These include methyl bromide, DDT, grain and soil fumigant mixtures.

The Westvaco Corp. also announces the appointment of Russel H. Beatie assistant manager of Westvaco's agricultural chemical sales, with particular responsibility for insecticides. Mr. Beatie is a graduate of Kansas State University, and holds a Masters degree in entomology. He was in the U. S. armed forces for three years, most of which time he spent in the South Pacific area in malarial control work.

•

John W. Wizeman Dies

John W. Wizeman, 51, chief of the Inorganic Branch of the Chemical Division, Civilian Production Administration, and United States member of the Fertilizer committee of international emergency food council, died August 15th at his home in Arlington, Virginia.

•

Big Insecticide Order

Because of serious threats of destruction of the $100,000,000 peanut crop in Alabama, Georgia and northwest Florida, planters in these areas recently ordered 2,250,000 lbs. of cryolite from Pennsylvania Salt Co., Philadelphia. Cause of the threat is the velvet bean caterpillar. To expedite matters, 50 tons of the insecticide were flown to Alabama in chartered planes, while the remainder of the order was delivered by freight. Reports say that the affected area includes more than 1,000,000 acres.

AIF Technical Committee Meets

The first meeting of the re-organized technical committee of the Agricultural Insecticide and Fungicide Association was held in New York last month, prior to the September meeting of the association. Members of the committee in attendance at the gathering included (standing, left to right) J. G. Brunton, Pennsylvania Salt Co.; R. H. Walcott of Stauffer Chemical Co.; Dr. H. B. Arnold of Tobacco By-Products and Chemical Corp.; Dr. W. D. Dove of Dodge & Olcott, Inc.; Dr. C. O. Eddy, Niagara Chemical & Sprayer Co.; Dr. G. R. Ferguson, Geigy Co.; Lea S. Hitchner, AIF Executive Secretary; A. E. Badertscher, McCormick & Co., and Harold Beekman, California Spray & Chemical Co.

Seated in the photo are Dr. R. E. Heal, Merck & Co.; E. F. Rothemich, Sherwin-Williams Co.; Dr. L. G. Utter, Phelps-Dodge Corp., Chairman of the committee; and Dr. Charles L. Smith of the AIF Association.

Four committee members were absent from the meeting. They are Dr. Alfred Weed, John Powell & Co.; Dr. G. L. McNew, U. S. Rubber Co.; L. G. Gemmell, American Cyanamid Co.; and I. W. Bales of Chipman Chemical Co.

Wm. Davidson Retires

William M. Davidson, for 35 years in the service of the United States Department of Agriculture, retired June 30, 1946. He has been in the insecticide division since July, 1920, and was at the time of his retirement in charge of the Division's Insecticide Testing Laboratory at Beltsville, Md.

Mr. Davidson is succeeded by Dr. Harold H. Shepard, formerly of the University of Minnesota, and for the past year Associate Professor of Insect Toxicology at Cornell University.

•

Chemical Ass'n Meets

Of the meetings scheduled for the coming year by the program committee of the Chemical Market Research Association, two appear of particular interest to the Agricultural Chemical trade. These are scheduled as follows:

September 17, 1946, at the Hotel Biltmore, New York, the subject will center around the fertilizer industry.

On October 31, Chicago's Palmer House is to be the location of the meeting, at which will be discussed "Chemicals in the food industry."

•

To Dedicate Shell Lab.

The new agricultural laboratory and experimental farm of Shell Oil Co., newly constructed at Modesto, Calif., was to be dedicated on September 11. Invited to be present on the occasion were a group of persons actively concerned with progress in agriculture, including members of university agricultural staffs, officials of federal and state departments of agriculture, and others.

Agronomists Meet

That 2,4-D can be used in dry form with fertilizer without detracting from the beneficial results of either the weed killer or the plant food, was announced at the recent four-day meeting of the Northeastern Section, American Society of Agronomy at the University of Maryland, College Park. Speakers at the meeting included representatives of the State and Federal governments, and of various universities. Chief topics of discussion centered around soil foods, of course, with numerous illustrations of successful application of fertilizers in increasing crop yields.

•

New 2,4-D Product

Howard Hanson & Co., 315 Pleasant St., Beloit, Wis., has announced to the hardware trade a new product, "Weedeath," said to use a 2,4-D formula and recommended as an "internal" weed killer which will not injure common lawn grass or grain.

DISTRIBUTORS:

HERE ARE 5 REASONS WHY YOU SHOULD HANDLE GEIGY GESAROL* AND NEOCID* DDT COMPOSITIONS

BECAUSE—

1. They have been developed by the ORIGINATORS of DDT Insecticides.
2. They are tried and proven—backed by SEVEN YEARS of research and experience.
3. They present a complete line of special formulations covering every field of DDT application. (Geigy offers 5 GESAROL compositions for sprays and dusts to control specific plant pests—6 NEOCID compositions for control of specific insects affecting man and animals.)

4. They are nationally advertised. Copy appearing in 22 national and sectional publications read by potato growers, truck farmers, horticulturists, dairymen and cattlemen all over the U.S.A.
5. Geigy provides a variety of colorful hard-hitting Dealer Helps such as Educational Booklets, Folders, Counter Displays, Streamers, etc., which carry EXTRA PUNCH because all the world knows that when it comes to DDT, facts from Geigy are facts from the source!

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Originators of DDT Insecticides

Cooperative Campaign

United Cooperatives, Inc., Alliance, O., is planning a promotional campaign for its "Unico" line of legume seed inoculants, which will include use of a folder, service manual and counter display piece for co-op stores. Inoculants have been handled under the co-op's private label for three years, Philip A. Keirn, manager of United's seed inoculation dept., told *Agricultural Chemicals*, but this is the first time sales helps of this sort have been used.

Processing and packing of the various strains available are handled by the commercial source of supply under strict laboratory and factory control. Separate strains are carried for soybeans, peas and vetch, alfalfa and clovers, trefoils, lupines, lespedezas, garden varieties of peas and beans, and peanuts. The material is hermetically sealed in pliofilm bags and placed in attractively designed cardboard containers printed in colors. Distribution to farmer-consumers is effected through the large regional farm supply cooperatives affiliated with United Cooperatives.

•

U.S. Insecticide Deal

For distribution to State health authorities, the Federal Public Health Service has purchased more than 300,000 pounds of powdered DDT and 52,000 gallons of the insecticide, the War Assets Administration has announced. Cost of the material was stated to have been $221,165. State health authorities are expected to use the material for the control of malaria and other communicable diseases in various parts of the country.

•

New Kansas U. Dean

Former head of the department of agronomy at Kansas State College, R. I. Throckmorton, has been made dean of the School of Agriculture and director of the Kansas Agricultural Experiment Station. He has been a member of the college soils staff since 1911, and head of the department of agronomy since 1925. His place is being filled by Dr. H. E. Myers who has been a member of the staff since 1928.

Powell Presents JP-70

John Powell Company is marketing a water miscible DDT insecticide spray concentrate under the trade name of "JP-70." The product is made from a mixture of different proportions of the isomers of DDT rather than from technical grade DDT, according to Dr. Joseph Skaptason, director of research and development. "As the name suggests," he explains, "JP-70 contains 70 per cent of DDT in the following approximate proportions: 16 per cent para para DDT, 39 per cent ortho para DDT, and 15 per cent of other polymers of DDT."

According to Dr. Skaptason, the ortho para form of DDT is known to be less toxic to certain insects, including the housefly, although it seems to be more effective with aphids. The toxicity of the two isomers, para para and ortho para seems to vary with insects, he states, but adds that evidence of this is not conclusive. "It would seem from tests made so far, these two isomers and others cannot be compared on a relative toxicity basis," he said.

The Powell Company points out that tests conducted so far show JP-70 to be unusually effective in insecticidal performance. It has been widely used in agricultural applications, and shows no foliage damage, the company says.

•

Oklahoma Ag. Prospects

"Looking Forward in Oklahoma Agriculture" is the name of bulletin B-299 published by the Division of Agriculture, Oklahoma A. and M. College, Stillwater. The work presents factual information from which long range agricultural possibilities for the state are projected.

Production opportunities are discussed, covering the growing of wheat, cotton, peanuts, broomcorn, truck crops, feed grains, corn, alfalfa, and good pasture lands. The livestock picture is presented as being conducive to the raising of dairy and beef cattle, swine, poultry, and sheep. Oklahoma's physical resources are enumerated, and the factors of agricultural credit and marketing are discussed fully. The booklet is available from Director W. L. Blizzard, Agricultural Experiment Station, Stillwater, Okla.

•

N.S.D.A. Meeting in Sept.

The National Sprayer and Duster Association will hold its first annual meeting at the Hotel Statler in Detroit September 19 and 20, according to John F. Benham, association secretary. The two day session will be devoted to business matters pertaining to the industry.

Potato Vine Killer

A late issue of *Dow Diamond* contains an article regarding dinitro-ortho-secondarybutyl-phenol, a product designed by Dow Chemical Company as a vine killer for potatoes. The story describes the action of this chemical combination as being equivalent to frost in preventing both blight and secondary growth in vines. Other advantages are pointed out in regard to facility of digging potatoes, and the possibility of getting bigger and more sound produce.

Micro Nu-Cop

A fixed neutral insoluble micronized* tribasic copper sulphate containing 53% metallic copper for dusting or spraying. No lime required—extremely fine particle size, 2-5 microns.

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Baker 2,4-D Production

Release of methyl and N-amyl esters of 2,4-D acid, and the morpholine salt of 2,4-D acid for formulation research purposes is announced by the J. T. Baker Chemical Company, Phillipsburg, N. J. According to Ralph Clark, vice-president of the company, these new organic chemicals are products of the firm's organic research under the direction of Dr. Joseph R. Stephens, and will shortly be in volume production. They will be manufactured in the new units under construction at the Phillipsburg plant.

•

New Dairy Germicide

Vestal Laboratories, 4963 Manchester Ave., St. Louis, Mo., have introduced to the dairy industry a new germicide, "Amerce," for disinfecting dairy and dairy farm equipment and available in one quart or gallon size containers.

A Standard Carrier for Insecticidal and Fungicidal Dust

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VERMONT

Dr. Jardine Retires

R. W. Trullinger, since 1938 assistant chief of the Office of Experiment Stations, U.S.D.A., has been named chief of the O.E.S. to fill the vacancy caused by the retirement of Dr. James T. Jardine. Dr. Jardine had been chief since 1931. In addition to his regular duties as chief, Dr. Jardine served for some six years as director of research in the Department.

The new chief is a native of Iowa and a graduate of Iowa State College, Ames. He has been with the Office of Experiment Stations continuously since March, 1912, except for a period of about two years when he was in military service in World War I.

•

Edico Corp. Meeting

At a recent meeting with salesmen and distributors of the Edco Corporation, Newark, Del., Mr. Ed. Dobbin, corporation president told of the success experienced by the company in merchandising its 5 lb. aerosol bomb, the "Mul-T-Vapor," used largely by greenhouses, dairy farmers, mushroom houses, and others in agricultural fields. The bomb, which is refillable, has been supplied to users all over the world, Mr. Dobbin said. He also pointed out that the Edco Corp. was the first to market such a product, and that the company will shortly place on the market insecticide aerosol dispensers in 30, 60 and 100 pound sizes.

•

Lime Deposits in N. J.

Discovery of a deposit of lime sand containing about 73 per cent of lime carbonate is reported to have been made recently in Burlington county, New Jersey. The deposit is estimated to contain about 700,000 tons. According to Dr. Henri Bader of the Bureau of Mineral Research of Rutgers University, under the sponsorship of which the discovery was made, the presence of this deposit in the agricultural district surrounding Burlington county will permit fertilization of crop lands there at less cost than now paid for importation of lime from other areas.

Lead Under Allotment

Manufacturers of insecticides are receiving lead allotments at the present time through a temporary arrangement recently announced by the Civilian Production Administration in Washington. This plan which came into effect July 22 and continues through September 30, is aimed to take care of seasonal requirements of manufacturers, but on a controlled basis whereby written permission from the C. P. A. must be given before lead is used in the manufacture of insecticidal products.

Lead needed by manufacturers is available in the same quantity as before, but the allotment is not automatic as was the practice in the past. The present arrangement is in the form of an amendment to lead chemicals order, L-354, which has been in effect since April of this year.

•

Bag Company Expands

Improvements amounting to upwards of $250,000 have been announced by Southern California Bag Co., of Los Angeles. The new expansion project is the fourth undertaken by the company in recent years, and includes a reinforced concrete building 120x500 feet to house both the new and used bag departments. Features of the new structure are sprinkler systems, glareless windows, air conditioning, recreation facilities, and a parking area for autos belonging to employees. William Tannenbaum, president of the firm indicates that modern machinery is ordered and is to be delivered upon completion of the building.

•

Oilseed Meals Controlled

Although Food Order No. 105, Amendment 1, controlling the acquirement of oilseed meals for fertilizer purposes has been terminated by the Department of Agriculture, restrictions upon the acquisition or use of edible oilseed meals for fertilizer purposes during the 1946-47 season are provided in an amendment to War Food Order No. 9. Certificates are required by the Order with respect to all deliveries of edible oilseed meal for fertilizer purposes. W.F.O.-9 also directs that edible oilseed meal acquired for use as fertilizer be used in areas and on crops where such meals had previously been used.

•

"4-X" Weed Killer

O. M. Scott & Sons Co., Marysville, O., is promoting in the institutional field a new selective weed killer, "Scott's 4-X," described as a powder to be dissolved in water and applied by sprayer or sprinkling can.

Announce Dairy Germicide

Adept Laboratories, 211 N. 8th St., Brooklyn 11, N. Y., has announced to the dairy industry the availability of "DPT," a new germicide claiming rapid bactericidal action. It is recommended as a rinse for processing equipment and storage facilities in dairy plants; as a disinfectant on udders and flanks of cows; and as germicidal agent for dairy barn floors, troughs and stanchions.

A New Emulsifier for DDT Solutions

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LITERITE-T, a new emulsifier designed especially for DDT solutions, plant spray formulations and other insecticidal compositions, produces crystal clear solutions to which any amount of water can be added. These emulsions are stable under all conditions of use and the DDT deposited from such emulsions will not be removed by subsequent weather conditions.

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242 W. 55th St. New York 19, N. Y.

COX COMMENTS

(*Continued from Page 45*)

tributed to soils with extensive faith in their general usefulness. It was sometimes stated that if gypsum was put upon soil it would even draw the fertility through the fence from the adjoining fields. During recent years it has been shown of less general value than formerly supposed. It is useful as a treatment for black alkali and to flocculate heavy soils to increase their permeability to water. Calcium Carbonate is useful for correcting soil acidity and to flocculate heavy soils. Neither has value as a general fertilizer.

Ignorance and superstition have been bed-fellows. Increased knowledge, fertilization and application of fertilizing materials have reduced old unfounded beliefs to a more and more rational basis. Farmers who use intelligently modern agricultural knowledge and follow good cultural practices are the ones who succeed.★★

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Technical Committee Head

Dr. L. Gordon Utter of Phelps-Dodge Corporation is the new chairman of the Agricultural Insecticide and Fungicide Association's Technical Committee. Dr. Utter succeeds Dr. Alfred Weed, John Powell & Co., New York.

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LISTENING POST

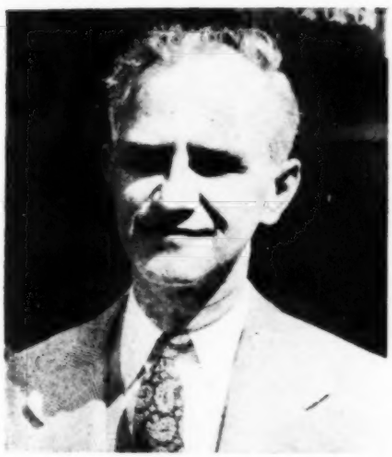
(*Continued from Page 43*)

Infestations of second-brood codling moth larvae have been generally light in most areas. European red mites and red spiders continue to be a problem in many eastern and mid-western apple orchards, especially where DDT has been used.

The Japanese beetle appeared to be generally somewhat more abundant this year in many parts of the area of general infestation. Serious damage to the foliage of its favored host plants is now apparent in many areas, including parts of Long Island, southern Delaware, and the eastern shore of Maryland.

The intensity of infestations of cabbage caterpillars on cabbage and related crops decreased rapidly in early August and are at comparatively low levels in most States except New Jersey, Virginia, and northwestern Tennessee. The cross-striped cabbage worm has continued abundant in northwestern Tennessee and has been observed damaging collards in eastern Virginia. Much cabbage in New York is being treated with DDT and perfect control of cabbage caterpillars has been reported with a 3 per cent DDT dust applied by airplane on a large field there.

Heads Legislative Group



Recently appointed chairman of the AIF Association Legislative Committee is L. L. Hedgepeth of Pennsylvania Salt Company, Philadelphia. He succeeds Walter S. Gavan of American Cyanamid Company.

The tomato hornworm has been reported causing serious damage to tomatoes in some New Jersey fields and conditions appear favorable for a heavy second generation of the pest. It has also caused some damage in eastern Virginia.

The yellow-striped armyworm, the fall armyworm, and cutworms were injuring cole crops in Virginia early in August. The pickleworm has been serious in Virginia and South Carolina and abundant populations of the squash bug were reported from Utah, Idaho and Tennessee. The squash borer appeared to be increasing in abundance and causing moderate damage to summer squash in northwestern Tennessee.

HEAVY infestations of the Mexican bean beetle have persisted into August in a number of States, including Virginia, South Carolina, Georgia, Florida, Alabama, and Mississippi. Infestations of less intensity have been reported from Maine, New York, New Jersey, northwestern Tennessee, Ohio, Nebraska, Wyoming, and northern Utah. The Mexican bean beetle infestation in southern California is still confined to the acreage originally found infested around Montalvo in Ventura County. All infested fields have been treated and as of August 10, populations were much reduced. Treatment of infested fields is being continued. Poor control was reported from airplane applications to some fields where ground machines were not used.

The potato leafhopper has continued to cause injury to beans over a wide territory, including New York, New Jersey, Virginia, and Wisconsin. They are still present in northwestern Tennessee, but the infestations there are low. Red spiders have been a pest of the bean crop in New Jersey, Virginia, and northern Utah, and sulfur applications have been necessary in some areas. The two-spotted mite has been troublesome in bean fields of south-central Idaho and southern California, requiring sulfur applications.

Infestations of the velvetbean caterpillar have continued in several southern States. During the first half of August infestations on peanuts were reported from North Carolina, Georgia, Florida, and Alabama. In general, the infestations appear to be light, although ragging has been ob-

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AGRICULTURAL CHEMICALS

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served in some areas of Georgia, Florida, and Alabama. A few worms were also observed on soybeans and cowpeas in North Carolina, on velvetbeans and cowpeas in Alabama, and in Louisiana infestations ranging from light to near stripping intensity have been reported from the lower sugarcane belt. The cotton aphid has been reported from all cotton-growing areas, but apparently has caused serious damage only in central Texas and in Alabama, especially in fields that have been dusted with calcium arsenate.

The cabbage aphid has been reported abundant early in August on cole crops in Wisconsin, Utah, and New Jersey and its presence on these crops was also reported from New York, western Washington, and southern California.

Populations of aphids on potatoes increased rapidly in Maine during the first half of August, especially in fields not treated with insecticides. Reports indicated that fair to good control of aphids on potatoes was being obtained and that fields with large aphid populations were in the minority.

Potato flea beetles were very active in early August on potatoes throughout the Red River Valley of Minnesota and farmers were dusting to control them. The potato leafhopper was reported at the same time causing moderate injury to potatoes in New York, Wisconsin, Minnesota, and North Dakota.

The information summarized above brings together data available as of August 15 concerning developments during the first half of August with regard to a number of the more important insect pests requiring insecticides for control.

•

Control of Potato Scab

Significant reduction of scab infection of potatoes by use of four seed potato disinfectants is reported by Purdue Agricultural Experiment Station, Lafayette, Ind., in the latest annual report of station activities. Seven seed potato disinfectants were used in an investigation which demonstrated the value of disinfection as compared to no treatment.

Wettable "Spergon," 'Fermate," wettable sulphur and "Thiosan," says the report, significantly reduced the percentage of tubers infected with scab." These, continues Dr. R. W. Samson, assistant chief of the Botany and Plant Pathology department, "are all easily used and relatively cheap instantaneous or dip treatments for seed potatoes. The seed treated with wettable "Spergon" yielded significantly more bushels per acre of scab-free potatoes than those seed lots untreated or treated with 'New Improved Semesan Bel,' yellow oxide of mercury or Thiosan."

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of Agricultural Chemicals, 254 W. 31st St., New York 1. Closing date: 1st of month.

Free Advts. for Veterans

As a service to veterans seeking jobs in the agricultural chemical field, this magazine will accept, without charge, classified advertising from World War II veterans seeking positions. Advertisements should reach us before the first of the month of publication, and should include all essential information, such as experience, skill, age, type of work sought and location desired. Address Agricultural Chemicals, 254 West 31st St., New York 1, N. Y.

Organic Chemist, Ph. D., extensive experience in manufacture and formulation of DDT and 2,4-D, 12 years experience in developmental research with successful record in conducting new processes for fine and heavy organic chemicals from laboratory through pilot plant into commercial production desires responsible position with progressive organization. Substantial background in synthetic medicinals and pharmaceuticals. Age 36, married. Address Box 117, care of *Agricultural Chemicals.*

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Nicotine Plant in Brazil

Although there is no Brazilian market for nicotine insecticides, there has recently been established in Bahia, Brazil, a nicotine-producing factory which is reported to have a daily capacity of about 450 pounds of 98 per cent alkaloid and 1,100 pounds of 40 per cent nicotine sulfate. The factory is claimed to be the only nicotine-producing plant in South America. The entire output of the factory is to go to a British firm.

•

Nalle to Pennsalt Board

Richard T. Nalle of Philadelphia has been elected to the Board of Directors of the Pennsylvania Salt Manufacturing Company to succeed the late John S. Jenks.

LISTENING POST

(*Continued from Page 43*)

tomato-producing areas in 1946. Destruction of the crop was almost complete on many farms in certain counties, and as high as 85 per cent of the early fruits in experimental plots were infected with late blight rot. A fixed copper dust with 6 per cent metallic copper was recommended for control of the disease. In many instances, however, the pathogen had gained such a foothold that dusting was not recommended. Where the dust was properly applied before the diseases became too serious it was effective and satisfactory control was obtained.

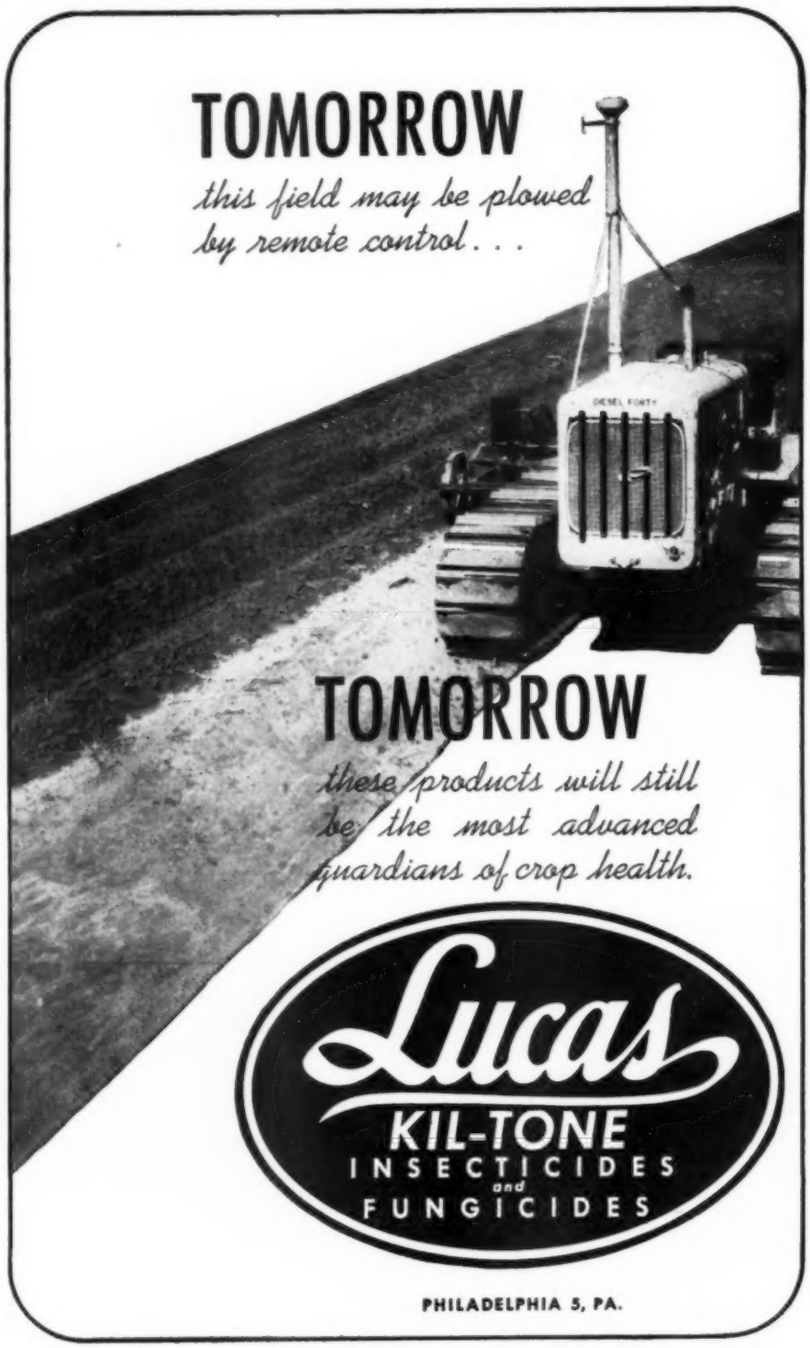
On the Eastern Shore of Maryland at least a trace of late blight was found in practically every potato and tomato field visited. Up to 30 per cent of the potato foliage was infected with almost 100 per cent of the plants showing some lesions in the most severely infected fields. A later Maryland report indicated that 85 per cent of the tomato crop throughout the southernmost counties of the Eastern Shore would be lost due to infection of the fruit.

In Delaware late blight was present throughout the State and did considerable damage. Dithane + zinc sulfate + lime was recommended as a control measure or, as a second choice, fixed copper sprays or dusts. In New Jersey, at the time the report was submitted, the disease was present but unimportant on potatoes and had not yet been observed on tomatoes. Late blight occurred on both tomatoes and potatoes in Pennsylvania.

The rapid spread caused many growers to replant several times. In a number of cases entire fields of young tomato plants were plowed under, in one county amounting to over 700 acres. Spraying with fixed coppers or Bordeaux or dusting with fixed copper was advised as a control measure. In West Virginia late blight was widespread on potatoes but had not yet been reported on tomatoes. Bordeaux, fixed coppers, and Dithane were generally recommended as control measures. Late blight appeared early and did much damage to the Indiana tomato crop. The evidence seemed conclusive that much of the disease was introduced on southern grown plants.

Large scale potato growers in Indiana are adequately equipped with spraying machinery and experienced in its use, but both home market gardeners and commercial tomato growers are generally without suitable apparatus. It was expected that if the outbreak continued extensive use would be made of airplanes to apply fungicides to canning tomatoes. Late blight was found to be generally present on both potatoes and tomatoes in Southern Illinois. Some of the largest potato growers sprayed with Bordeaux or fixed copper but most growers used no sprays or dusts. One tomato grower sprayed with Bordeaux 10-10-100, which noticeably checked the spread of the disease.

In New York the disease was first noted on plants shipped in from the South.★★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New Trade Marks . . .

Application has recently been made to the U. S. Patent Office for registration of the following trade-marks for products in the agricultural chemical field, and the marks listed were published in July and August issues of the OFFICIAL GAZETTE. The Patent Office requires that notice of any opposition to registration of a trade-mark be filed within thirty days of publication in the GAZETTE, accompanied by a fee of ten dollars.

Trade Mark Applications

ATOMIC INSECTICIDES. In white capital letters on dark background with falling bomb motif. for insecticides. Filed October 2, 1945. by Worthington Products Co., Inc., Arlington, Va. Claims use since Aug. 9, 1945.

TEKNOL. In italic capital letters. For insecticides. Filed Dec. 8. 1945 by Amos R. Beamon, doing business as Teknol Products Co., Los Angeles, Calif. Claims use since June 15, 1939.

JOEL E. LANKFORD. Represented by portrait and signature of applicant. For stock powders used for horses, cattle and hogs, to relieve constipation and excess acid, remove worms, and purify the blood. Filed Dec. 22, 1945. by Joel E. Lankford, Suffolk, Va. Claims use since Aug. 22. 1945.

OLD TRAPPER. In old-fashioned hand-lettered capitals, with hunter motif at side. For powders for killing fleas, lice and ticks; poisons for killing rodents, insecticides, and a combined insecticide and sulfur dust. Filed Mar. 13, 1946, by J. A. Stanley, doing business as Stanley Industries, Seattle, Wash. Claims use since Jan. 1, 1941.

DIFUSOLIER. In tall sans serif capital letters. For electrically heated atomizer for spraying liquids. Filed Aug. 17, 1945 by Tanglefoot Company, Grand Rapids, Mich. Claims use since Aug. 3, 1945.

DINITROSOL—In capital letters, for insecticides and fungisides. Filed Nov. 28, 1945. by the Sherwin-Williams Co., Cleveland, Ohio. Claims use since Aug. 13, 1945.

RED BALL—In capital letters, with a red circle between words. For insecticides. Filed Jan. 29, 1946, by Fred L. Smith, Paola, Kan. Claims use since June 24, 1944.

TENIATHANE—In capital letters. For anthelmintic tablets. Filed March 6, 1945 by Allied Laboratories, Inc., doing business as Pitman-Moore Co., Indianapolis, Indiana. Claims use since Aug. 14, 1945.

LUSH—In hollow capital letters. For exfoliated vermiculite for soil conditioning and plant germination. Filed Dec. 6, 1945 by Universal Zonolite Insulation Co., Chicago. Claims use since Nov. 8, 1945.

LINELIFE—In script letters representing rope, for fungus inhibiting and impregnating chemicals. Filed Nov. 21, 1945, by Paint Engineers, Inc., New York and Hawthorne, N. J. Claims use since Nov. 5, 1945.

Trade Marks Granted

422,336. FERTILIZER. Clyde Vaughn, doing business as Pestless Products Co., Pasadena, Calif. Filed Oct. 22, 1945.

422,348. ANTIBACTERIAL PREPARATION MORE COMMONLY APPLIED IN VETERINARY USE. Sharp & Dohme, Inc., Philadelphia. Filed Nov. 27, 1945.

422,367. CHEMICAL USED FOR THE GENERATION OF A GREENHOUSE FUMIGANT. Hydroponic Chemical Co., Inc., New York. Filed Nov. 27, 1945.

422,412. AGRICULTURAL AND INDUSTRIAL MACHINERY — NAMELY FEED GRINDERS AND ACCESSORIES, ENSILAGE CUTTERS, ETC. Davis Westholt Mfg. Co., Inc., Witchita, Kans.

422,588. INSECTICIDE. Eight-in-One Products Co., Valdosta, Ga. Filed Nov. 27, 1945.

422,591. INSECTICIDE AND INSECT REPELLENT. Robert D. Spiers, doing business as Robert D. Spiers Laboratories, St. Petersburg, Fla.

422,754. FERTILIZERS. Oil Sprays, Inc., also doing business as Crop King Co., Yakima, Wash. Filed May 28, 1945.

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Ragweed Control Effort

Promise of relief to hay fever sufferers through a method for treating ragweed with herbicides to prevent the production of pollen, is indicated by Michigan Agricultural Experiment Station, East Lansing, Mich., following two years' experimentation.

Before making positive claims, confirmation of early laboratory results were being sought by the experimenters when plants were available under natural conditions, as expected during the current hay fever season.

Five different chemicals were used in the preliminary studies including two compounds known as "G-412" and "G-410," provided by Dow Chemical Co.; a complex mixture of refinery wastes, supplied by the Leonard Refining Co.; a commercial weed killer named "Dry Sinox," and finally water white kerosene containing no added toxicant.

"G-412," a report of the investigations states, 'gave a complete kill of ragweed within a period of 6 hours. The vegetative portion of the plant as well as flower spikes, turned brown and pollen release was stopped. Water solutions of this material killed more slowly and where a 50 ml. dilution was used killing was not complete. Eventual recovery seemed likely but an early frost terminated the experiment."

"G-410," the report continues, gave a 75 per cent kill in 12 hours, but some stems remained alive and continued growth until frost. Pollen was not again produced by these plants. "Sinox" killed only the younger leaves and flower spikes, the investigators reported. Axillary buds developed and young flower shoots were evident at the time of the frost. The refinery residue, at a dilution of 1 to 4, completely killed the ragweed but was difficult to apply and left an unpleasant odor.

Industry Patents

No. 2,404,273. METHOD OF AND APPARATUS FOR SPRAYING. Patent granted July 16, 1946 to Niels C. Christensen, Salt Lake City, Utah. The method of making a spray from liquids or fluid mixtures of finely divided solids and liquids which consists in projecting said liquid or mixture upon the surface of a rotating cylinder in the form of a sheet approximately tangent to the surface of said cylinder and rotating said cylinder about its axis at such speed that liquid of fluid supplied to said surface is thrown from the surface of said cylinder as a rain or spray, said sheet of liquid or fluid mixture being projected in opposite direction to the motion of the cylinder in the zone of contact.

No. 2,404,698. INSECT REPELLENT COMPOSITION. Patent granted July 23, to Alfred Dreyling, South River, N. J., assignor to E. I. du Pont de Nemours & Company, Wilmington. A non-aqueous insect repellent composition of gel-like consistency substantially free from highly volatile solvents comprising a plurality of cellulose derivatives selected from the group consisting of cellulose esters and cellulose ethers and at least one non-volatile insect repellent which is a solvent for the cellulose derivatives separately, the said cellulose derivatives being incompatible when combined in the said repellent whereby a gel-like consistency is obtained.

No. 2,404,272. TERMITE CONTROL DEVICE. Patent issued July 16 to Troy F. Childers, Joplin, Mo. A gravity actuated reversible device in combination with an object of wood for preserving the wood from the destructive action of termites. The device is adapted respectively for operative or inoperative positions and comprises a closed container for a liquid insecticide, a tube with a flange attached to the wall of a permanently open outlet near one end of the container. This tube extends into a hole in the said object of wood, and is arranged to cooperate with the wall structure of the said hole to permit the container to be swung about the axis of the tube from one position to another, a knee-shaped bracket fastening on said end of the container, said bracket having a bend directed towards the center of the container and its free shank bent back against the adjacent face of said object with the container in upright position and means securely attaching said shank against the wood object thereby supporting the container firmly in upright, operating position on the wood object.

•

Barrett Appoints Wright

David N. Wright has been appointed agronomist in charge of agricultural work on the Pacific Coast by the Barrett Division of the Allied Chemical and Dye Corporation, New York.

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CHEROKEE CLAY for WET SPRAY
VEEGUM for SPRAY STICKER

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Universally used with DDT and all Dusts

CHEROKEE CLAY
For Sprays—Stays in Suspension longer

VEEGUM
In Wet Sprays—a Sticker of proven value

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Warehouse stocks of PYRAX ABB available at strategic points throughout the United States

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Specialties Dept.
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GUEST EDITORIAL

(*From Page* 18)

an insecticide? The fact that it will kill an insect, the first requisite, is relatively simple to establish but also relatively unimportant, when we remember that many common things such as crude oil, creosote, and strong caustics or acids kill insects. The important and much more difficult problem is to determine whether it will kill insects under the various conditions surrounding its use. Some of the questions which the research man puts to himself before he is willing to make recommendations follow:

What insects will the candidate insecticide kill? What is its relative toxicity compared with known materials? Against what stages of the insect is it effective? Is it a stomach or contact poison, or a fumigant? How can it best be applied—as a dust, a spray, or an aerosol? Can it be applied with standard equipment or must new equipment be devised? Is it compatible with other insecticides, solvents, carriers, or fungicides? At what strength should it be applied? At what dosage per acre? How frequently?

Will it injure plants either when applied to the foliage or the soil? What plants? Is it toxic to man or domestic animals? Acutely or chronically? Internally or externally? What effect does it have on wildlife, birds, fish, etc.? Pollinating insects? Beneficial insects such as parasites or predators? In what quantities is it toxic to these forms of life? Can control be obtained without leaving residues? Do they persist: if so, how can they be removed? Does the material enter the plant? What plants, and in what quantity?

How do conditions at time of application affect results? Is effectiveness dependent on a certain range of temperature or humidity? Is there a regional variation in effectiveness? Are the results consistent?

How does it compare with other insecticides in effectiveness, availability, cost, ease of application, and safety to plants, animals, and operators?

Fortunately, not all of these questions need be answered before some recommendations can be made for local or specific control problems. These are most frequently within the province of State stations. More general recommendations, such as those made most frequently by the Federal bureau, are facilitated thereby; however, regional recommendations require consideration of many questions not involved in recommendations for specific areas. Most of the questions enumerated above must be answered before general recommendations can be made for use against many important crop-infesting species. Fortunately, also, good research is good wherever you find it. Many agencies, including Federal, State, private, and industrial laboratories, contribute to the accumulation of necessary information. The excellent research staffs maintained by some members of industry are doing sound, high-grade research which adds its contribution to that made by State and Federal laboratories. All adds to the information which can be evaluated in getting answers to the questions—questions which must be answered to protect the user, the public, the vendor, and the manufacturer.

An important factor in increasing the speed of final recommendation is the cooperative spirit which has developed between research workers in industrial laboratories and those in State and Federal laboratories. This cooperation and mutual confidence and respect between such workers is to be encouraged. The exchange of technical results and ideas is an important feature in rapid development and should be facilitated and stimulated as far as can be done within the proprieties which must be observed by both Government and industry.

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Powell Has Anniversary

John Powell & Company last month celebrated the 23rd anniversary of its founding in New York. The firm, a pioneer in the insecticide field, had its beginning in a small establishment in downtown New York, and has continued since that time to manufacture insecticides.

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"Step on it, Cuthbert, yo' is gainin' on him!"

No Law, But...

THERE is no law against catching bugs with a vacuum cleaner or making a business trip from New York to Chicago on a bicycle. But for us, we prefer the less devious means to an end. Just like in advertising you can hit a doctor or two per thousand in the general magazines, but if we wanted to advertise something to doctors, we would go for the medical journals and doctors' magazines. They go direct,—no waste, lower cost, better results.

And if we wanted to advertise to cover the field of agricultural insecticides, fungicides, fertilizers, weed killers, etc., we would seriously consider a medium which goes direct and specializes in the field, such as

AGRICULTURAL CHEMICALS

254 WEST 31st STREET **NEW YORK 1**

TALE ENDS

THE effect of radioactivity on insects and plant life is expected to be determined eventually when results of the Bikini experiments with the atom bomb are fully computed. The U. S. Department of Agriculture sent scientists to the scene to collect specimens exposed to radioactive dust . . . and to transport various species of insects to the atoll to be exposed to the phenomenon. Among the latter were beetles, star ticks, dog ticks, fowl ticks, cheese mites, weevils, moths, mosquitoes and other insects, the control of which many agriculturalists would be happy to accomplish.

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Soilless gardens with an area totaling some 80 acres are being built in Japan for American occupation forces. Reports describe the project as being constructed in long beds of gravel on water solutions of fertilizer chemicals as plant food. Termed the world's largest non-soil agricultural venture, the Japanese experiment may reveal some hitherto unknown facts about such things. At least it is interesting to watch from a grandstand half way around the world.

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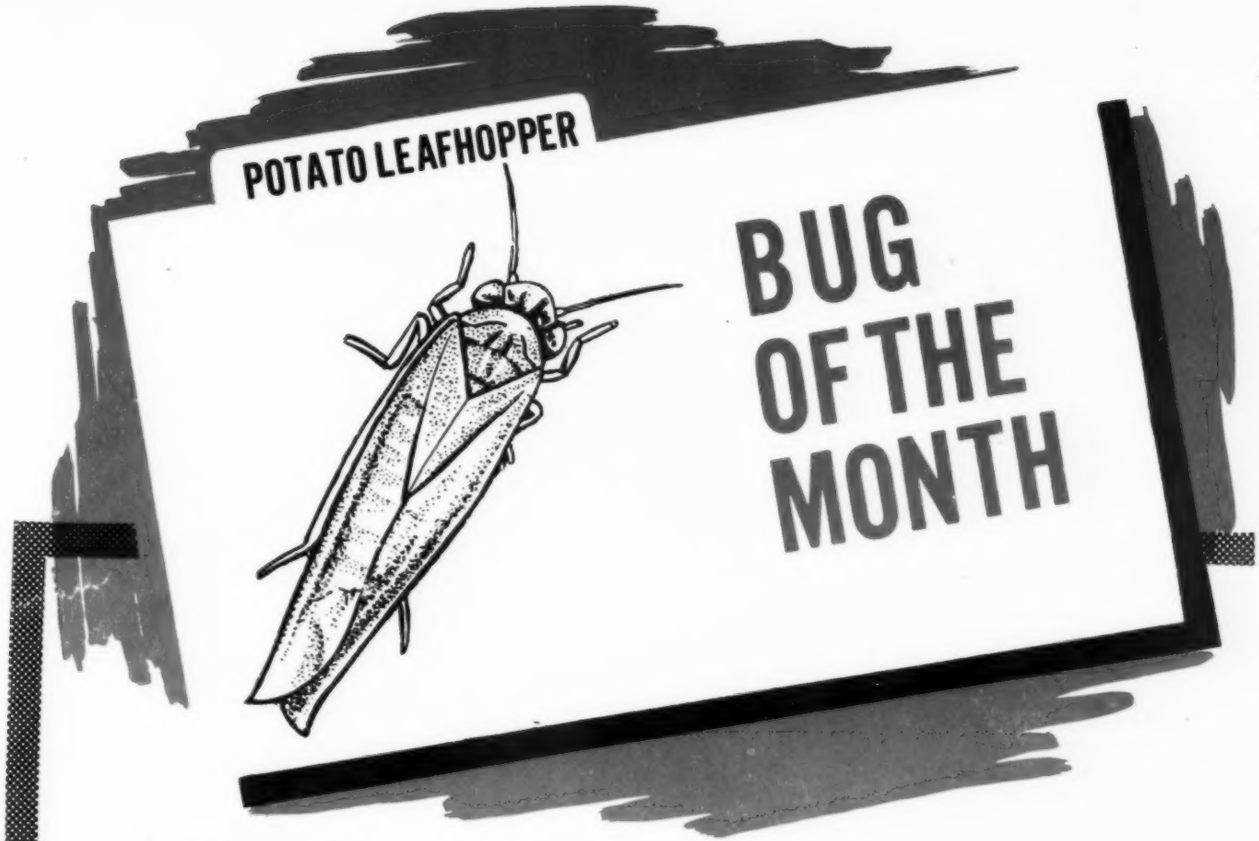
In the "now-it-can-be-told" category is the story of how the United States planned to use, if necessary, crop-destroying chemicals on enemy countries to cause widespread famine and thus cause economic collapse and general chaos. Such biological warfare would have been carried on with use of such chemicals as 2,4-D, possibly sprayed from airplanes. In secret experiments at Camp Detrick, Md., not far out of Washington, D. C., some 1,100 combinations of chemicals were tested, to set up a vast knowledge of plant hormones which, we hope, will now be used for peaceful means in agriculture. Many types of food plants were used in the experiments, and results reveal that no crop can be considered safe against such an attack. By the same token, it is a safe guess that no crop will be entirely outside the helpful aspects of these findings.



PRENTISS FOR PEST-TESTED *Basic Insecticides*

Every grower East of the Rocky Mountains is well aware of the destructiveness on potatoes, beans, grapes, etc., of the Potato Leafhopper—the bug for the month of September. The one proved way to control the Potato Leafhopper is to dust early and often with a Pyrethrum dust mixture; and *Prentiss Pyrethrum Powder* is finely ground and specifically formulated for agricultural dusts containing pyrethrum.

Also, run down this list of other *Prentiss* basic insecticides:

(1) *Micro Mesh Dry* (50% DDT Powder) used for mixing to compound DDT powders that can be used as agricultural dusts, mosquito larvacides, louse powder, etc.

(2) *Micro Mesh Wettable* (50% DDT Powder). This material contains a balanced quantity of both wetting agent and dispersing agent and suspends in water with a minimum of agitation.

(3) *Prentiss #10 Concentrate*, a liquid concentrate containing 50% by weight of mixed DDT isomers, for use in manufacturing residual insecticides containing DDT isomers.

(4) *25% Water Miscible DDT Concentrate* making an effective and economical residual spray.

(5) *30% DDT Oil Concentrate*—for use in manufacturing fly sprays or residual sprays.

(6) *Prentiss Cubé Powder*, finely milled and of uniform rotenone content.

(7) *Prentiss Pyrethrum Concentrate*, the most effective and economical basic material for contact sprays.

Plan now to use Prentiss Basic Agricultural raw materials and intermediate products in the production of your agricultural and livestock insecticides.

R. J. PRENTISS & COMPANY, INC.

110 William Street, New York 7, N. Y. — 9 So. Clinton St., Chicago 6, Ill.

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PRENTISS

RAW MATERIALS FOR AGRICULTURAL INSECTICIDES

PYRENONE

(REG. TRADE MARK)

dust bases

For two years, Pyrenone Dust Bases have been successfully and widely used in the manufacture of agricultural dusts for the control of a wide variety of insects and on many crops, but our inability to manufacture them in adequate volume to meet demand has presented an impossible barrier to our natural desire to publicize their merits or promote their wider use.

Supplies for the 1947 season will be greatly increased. We feel safe now in urging all manufacturers of agricultural dusts to investigate their possibilities, with the assurance that in event of adoption, adequate quantities can be supplied for a program.

Pyrenone Dust Bases owe their effectiveness to carefully adjusted combinations of a new and already widely known organic chemical, piperonyl cyclohexenone (D&O 312), and pyrethrins impregnated on an organic carrier and mix readily with the various pyrophyllite and talc type carriers. The finished dusts are economically effective against a wide variety of insects including those customarily controllable with pyrethrum dusts, and many which are not. Their use involves no hazards and no toxic residue problems, and they show substantial residual killing power against insects for some time after application. More detailed information on request.

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